UNIVERSITY OF MINNESOTA
ST. ANTHONY FALLS LABORATORY
Engineering, Environmental and Geophysical Fluid Dynamics

Project Report Number: 563

Third-Party Rating Curve Development and Debris Testing for Thirsty Duck® ER-200 Buoyant Flow Control Device

by

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Prepared for
Thirsty Duck, Ltd

February 2012

Minneapolis, Minnesota

Project General Information

Title:
Thirsty Duck® Rating Curve Development

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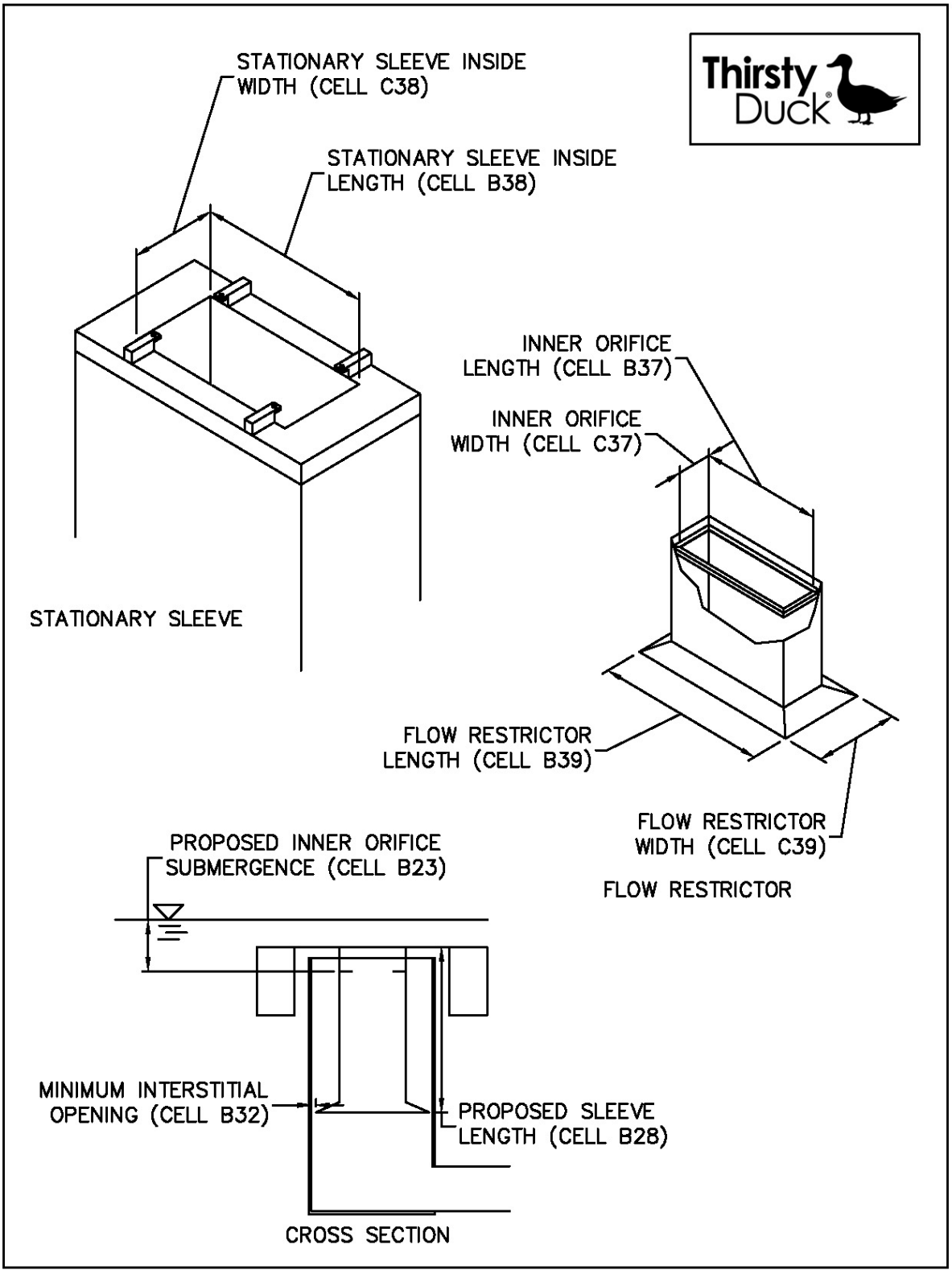
1. Introduction

The University of Minnesota, St. Anthony Falls Laboratory (SAFL) was contracted by Thirsty Duck, Ltd to conduct a testing program on a buoyant flow control device. The focus of the study was to develop rating curves and analyze debris performance for the ER-200 series device. Debris performance testing included leaves, grass (hay), aluminum cans, plastic bottles, and sticks/vines. The rating curves were monitored during debris performance tests to determine if the select debris impaired the function of the device.

The ER-200 device was designed to be installed in a concrete inlet. For this study the device was designed for a Florida Department of Transportation (FDOT) Type C standard inlet (Appendix A). A diagram of the ER-200, provided by Thirsty Duck, Ltd, is provided in Figure 1. There are four primary components to the device. The first is a stationary sleeve which fits inside the concrete inlet. The second component is a moving flow restrictor that has both an orifice in the center and a flared base that creates and annulus between the flow restrictor and the stationary sleeve. Third is a set of floats that raises the moving flow restrictor such that the pressure head between the pond surface and the orifice and annulus is constant. Finally, a skimmer plate is attached to the floats to prevent floatable debris from entering the device.

Figure 1 – ER-200 Diagram provided by Thirsty Duck, Ltd.



2. Experimental Setup

A full scale ER-200 device was installed in the basement level of SAFL. The device was mounted in a timber inlet constructed to the dimensions of a pre-cast FDOT Type C standard inlet. The ER-200 was installed to control the discharge out of a 10'x10'x8' deep pool basin that was constructed around the device. The inlet to the pool basin was a 12-inch pvc pipe with a gate control valve. The inlet pipe was fed from water drawn from the Mississippi River, 50 feet above, and conveyed through the laboratory. The outlet through the ER-200 was plumbed with an 18-inch steel pipe that discharged into a stilling basin. From the stilling basin, water flowed through a straight channel and over a calibrated weir. Figure 2 is a diagram of the test apparatus. The height of the water stage was measured directly using an open air manometer attached to the side of the pool basin. The discharge through the device was measured via the weir at the outfall of the stilling basin. The height of the water over the weir was measured using a sonar probe. Water levels were monitored in the tail box to ensure that the pipe outlet was never fully submerged during the rating curve tests and debris tests.

Figure 2a – Profile diagram of the test apparatus

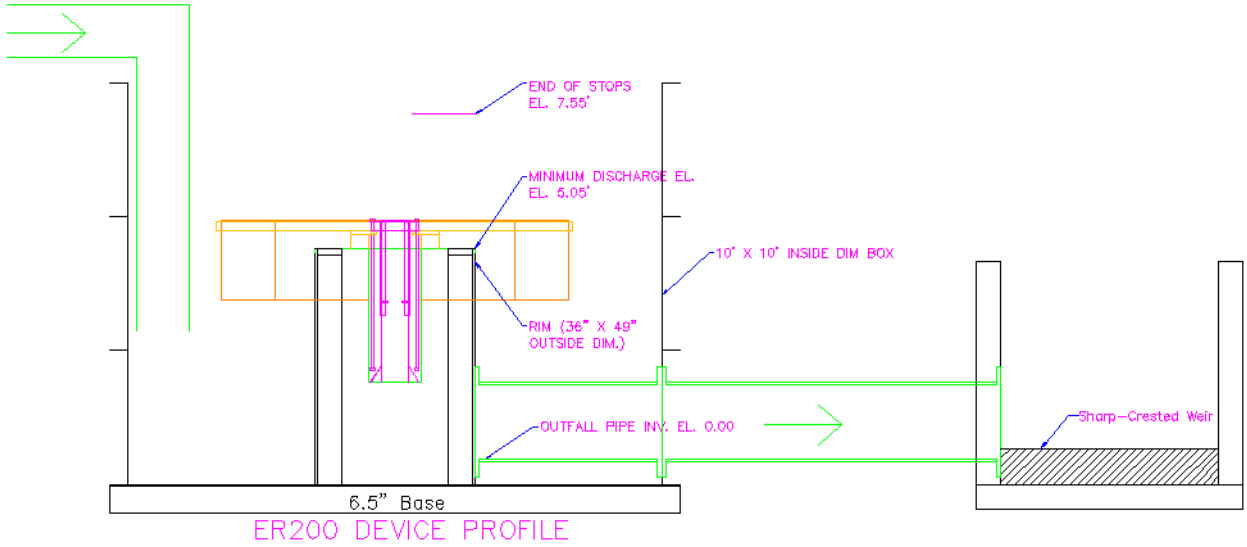
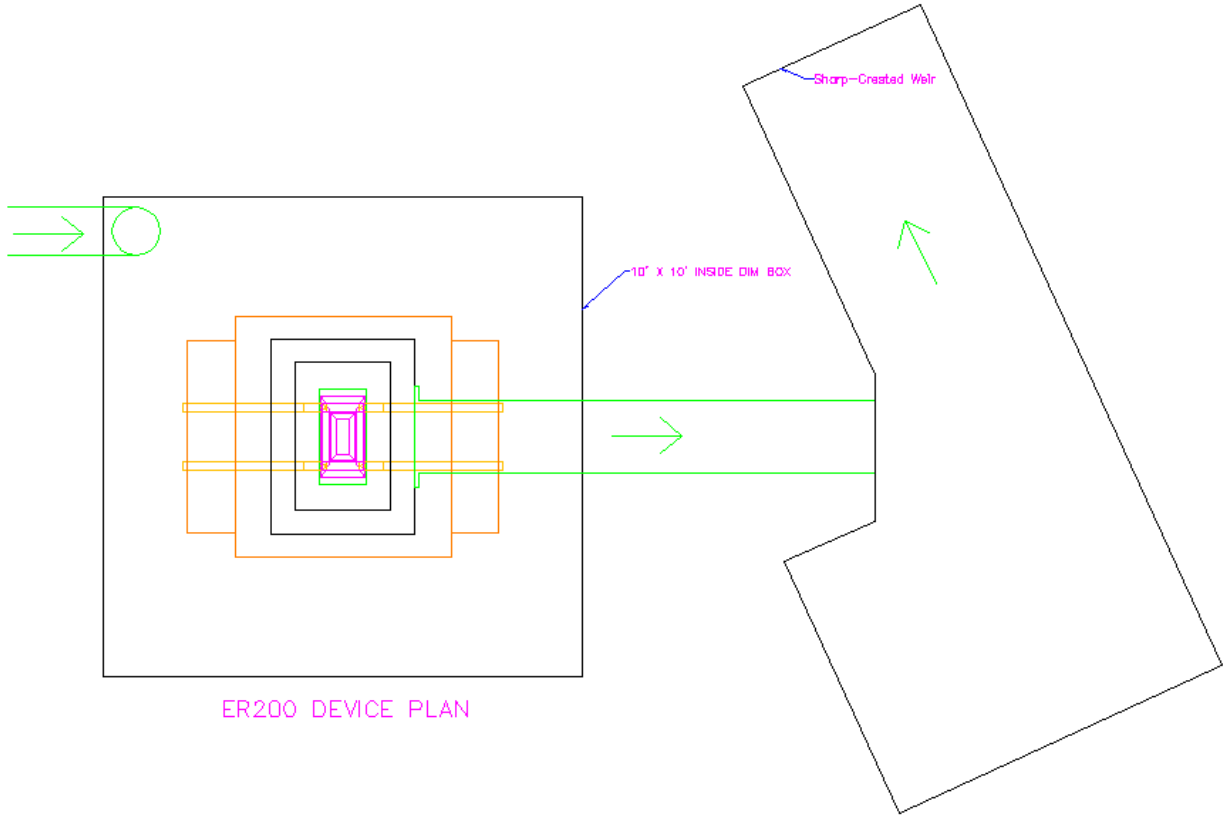


Figure 2b – Plan View diagram of the test apparatus



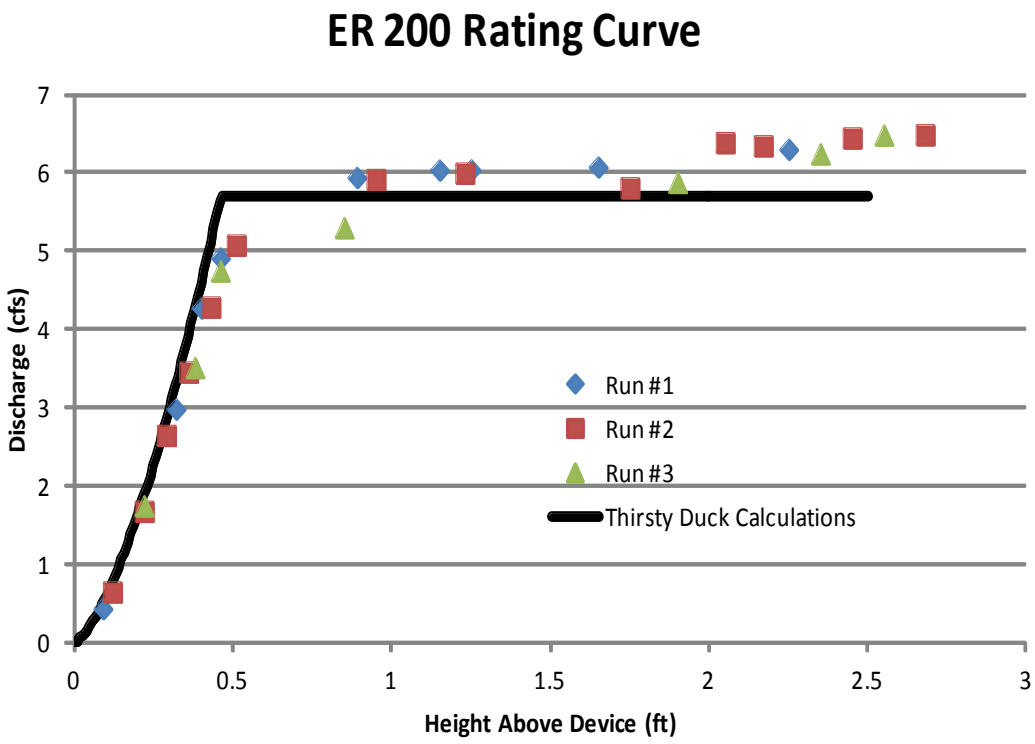
3. Free Discharge Rating Curve Development

Stage-discharge rating curves for a free discharge condition were developed for the device via three test runs. The results of these runs are provided in Table 1. Figure 3 contains a plot of the rating curve data along with the predicted rating curve for the device as provided by Thirsty Duck, Ltd (Appendix B). The data matched the predicted discharges with an average error of 10% and a root-mean-square error of 0.5 cfs. These values are within the expected error of a standalone weir/orifice constructed from a concrete inlet. Note in Figure 3 that the discharge continues to rise slightly over the zone predicted to have constant flow. This is likely due to the floats floating slightly lower in the water near the top of the device's stroke. Decreased buoyancy may be due to rapid filling rates, excessive turbulence in the pool, or increased drag force on the restriction.

Table 1 – ER-200 Free Discharge Rating Curve Data

Run # 1	12/6/2011 4:00pm		Run # 2	12/7/2011 9:15am		Run # 3	12/7/2011 12:30pm	
	Height Above			Height Above			Height Above	
Water Height	Device	Discharge	Water Height	Device	Discharge	Water Height	Device	Discharge
(ft)	(ft)	(cfs)	(ft)	(ft)	(cfs)	(ft)	(ft)	(cfs)
5.14	0.09	0.44	5.17	0.12	0.65	5.27	0.22	1.75
5.37	0.32	2.99	5.27	0.22	1.68	5.43	0.38	3.52
5.45	0.4	4.28	5.34	0.29	2.65	5.51	0.46	4.75
5.51	0.46	4.92	5.41	0.36	3.46	5.9	0.85	5.31
5.94	0.89	5.95	5.48	0.43	4.29	6.95	1.90	5.89
6.2	1.15	6.04	5.56	0.51	5.08	7.4	2.35	6.25
6.3	1.25	6.05	6	0.95	5.92	7.6	2.55	6.49
6.7	1.65	6.08	6.28	1.23	6.00			
7.3	2.25	6.31	6.8	1.75	5.82			
			7.1	2.05	6.39			
			7.22	2.17	6.35			
			7.5	2.45	6.45			
			7.73	2.68	6.49			

Figure 3 – ER-200 Free Discharge Rating Curve



4. Debris Performance

Debris performance testing was performed for the full range of device operation. Tests began with the pool fully drained. This allowed some debris to bypass the skimmer as the pool filled. The position of the inlet pipe was set such that significant upwelling was visible within the pool. This upwelling also allowed

debris to bypass the skimmer. This condition represents an extreme debris loading condition and is considered conservative, because it is unlikely that the ER-200 device will ever be used in a pool smaller than 10 feet by 10 feet. Video documentation of the debris test experiments is provided in Appendix C.

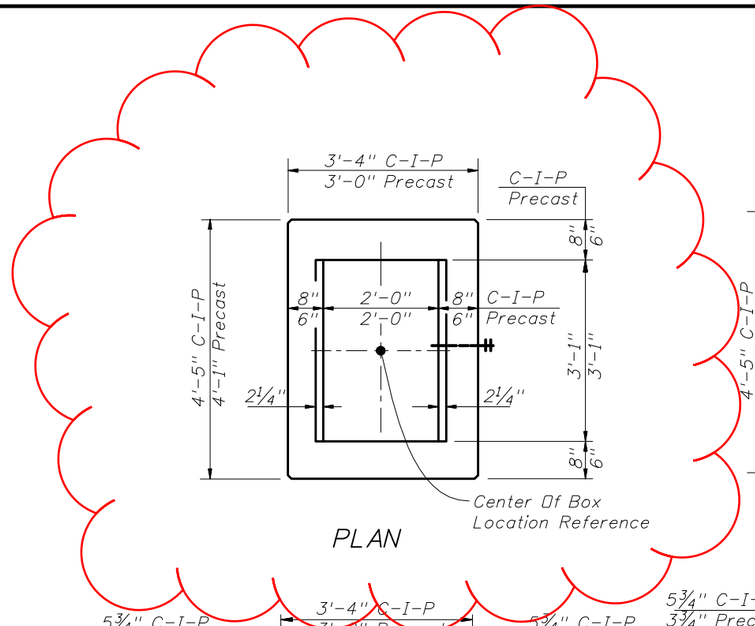
The first debris test was conducted with 0.5 cubic yards of dried leaves and 0.3 cubic yards of hay. This translates to a 2.5-inch thick mat of leaves and hay across the surface of the pond. For the second debris test, 25 soda cans and 10, 20-oz plastic bottles were placed in the pool. Neither the leaf/hay test nor the can/bottle test were able to foul the device or diminish the rating curve. The third debris test attempted to manually foul the device by hand placing hay and soda cans in the moving restrictor frame. Half of the material that was hand placed, washed out during the third debris test. The material that remained did not diminish the rating curve. The annulus around the restrictor was designed to allow trapped cans and bottles to pass along the ends of the restrictor. There was one can that was prevented from reaching the wider end of the annulus by the guide rods. Relocating the guide rods would prevent this trapping without modifying the rating curve.

The fourth debris test consisted of sticks and vines between 8 inches and 5 feet long. The presence of sticks and vines did not diminish the rating curve or prevent the device from rising. At the end of the run a few sticks were trapped between the stationary sleeve and the frame for the floats. An additional run found that the trapped sticks did not interfere with the operation of the device.

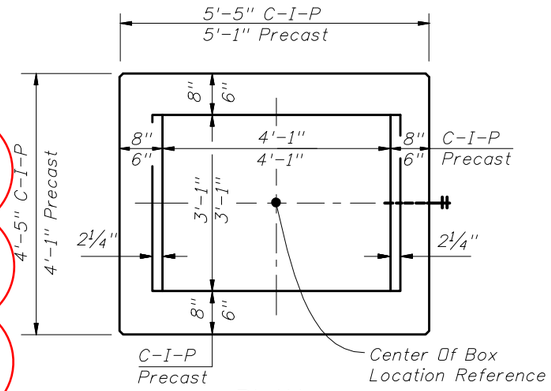
5. Summary

SAFL conducted third-party testing of the Thirsty Duck, Ltd. ER-200 series buoyant flow control device. SAFL measured the stage-discharge rating curve and found it to perform within 10% of the predicted rating curve. Debris performance was tested under an extreme case with leaves and hay, soda cans and bottles, sticks, and vines. The debris tested was unable to foul the device or modify the rating curve.

Appendix A – FDOT Standard Inlet



PLAN



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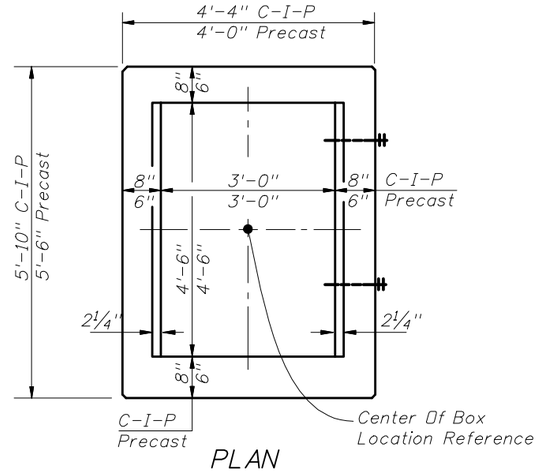

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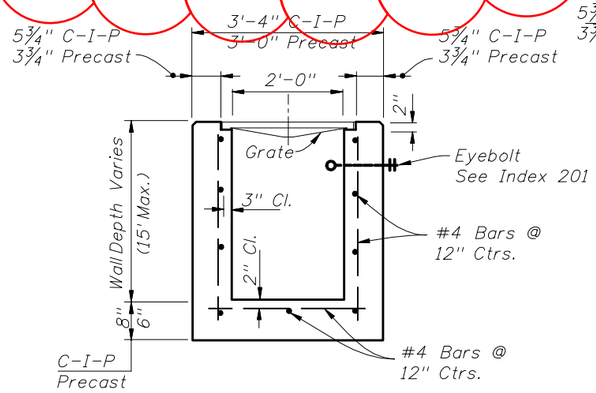


SECTION

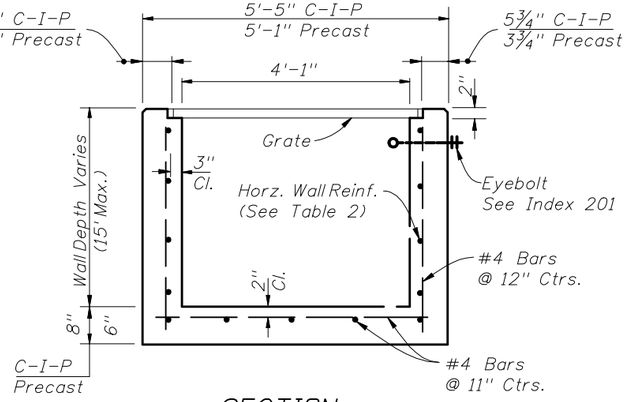
HORIZONTAL WALL REINFORCING SCHEDULES (TABLE 1)

WALL DEPTH	SCHEDULE	AREA (in.²/ft.)	MAX. SPACING	
			BARS	WWF
0'-15'	A12	0.20	12"	8"

TYPE C

Recommended Maximum Pipe Size:

2'-0" Wall – 18" Pipe
3'-1" Wall – 24" Pipe (18" where an 18" pipe enters a 2'-0" wall)



SECTION

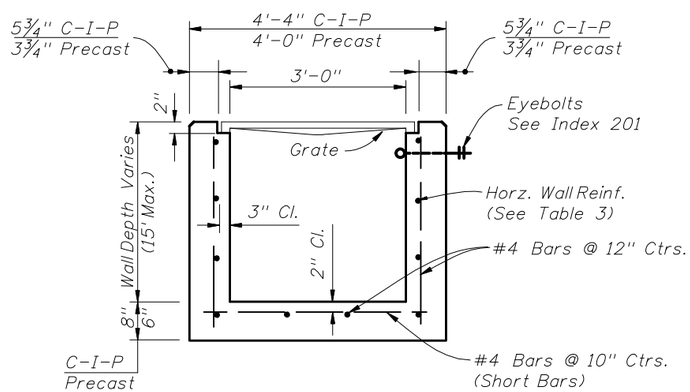
HORIZONTAL WALL REINFORCING SCHEDULES (TABLE 2)

WALL DEPTH	SCHEDULE	AREA (in.²/ft.)	MAX. SPACING	
			BARS	WWF
0'-6'	A12	0.20	12"	8"
6'-10'	A6	0.20	6"	5"
10'-13'	A4	0.20	4"	3"
10'-15'	B5.5	0.24	5½"	5"

TYPE D

Recommended Maximum Pipe Size:

3'-1" Wall – 24" Pipe
4'-1" Wall – 36" Pipe



SECTION

HORIZONTAL WALL REINFORCING SCHEDULES (TABLE 3)

WALL DEPTH	SCHEDULE	AREA (in.²/ft.)	MAX. SPACING	
			BARS	WWF
0'-5'	A12	0.20	12"	8"
0'-7.5'	A6	0.20	6"	5"
7.5'-10'	B5.5	0.24	5½"	5"
10'-15'	C6.5	0.37	6½"	6"

TYPE E

Recommended Maximum Pipe Size:

3'-0" Wall – 24" Pipe
4'-6" Wall – 36" Pipe

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

2010 FDOT Design Standards

DITCH BOTTOM INLET TYPES C, D, E & H

Last Revision	Sheet No.
07/01/05	1 of 7
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Appendix B – Thirsty Duck, Ltd Rating Curve Predictions

St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
RATING CURVE COMPUTATIONS
TAILWATER ELEVATION -5 ft ASSUMED

DATUM: ASSUMED

DESIGN ELEVATIONS (ft ASSUMED):

TOP OF BANK	7.00	ft ASSUMED
MINIMUM DISCHARGE ELEVATION	4.00	ft ASSUMED
DESIGN PEAK STAGE	6.50	ft ASSUMED
DESIGN TAILWATER	-5.00	ft ASSUMED

ORIFICE DATA:

C (INNER ORIFICE)	0.6	unitless
C (INTERSTITIAL OPENING)	0.8	unitless
PROPOSED SUBMERGENCE (INNER ORIFICE)	1.00	ft
FLOW THROUGH ORIFICE?	YES	YES/NO
DISTANCE FROM ORIFICE TO TOP OF MOVING RISER	0.25	ft

SLEEVE LENGTH:

MINIMUM SLEEVE/MOVING RISER LENGTH	3.50	ft
PROPOSED SLEEVE/MOVING RISER LENGTH	2.50	ft

INNER ORIFICE AND INTERSTITIAL OPENING SIZE:

MINIMUM INTERSTITIAL OPENING	0.50	inches

	LENGTH (inches)	WIDTH (inches)	AREA (sq. inches)	AREA (sq. ft)
INNER ORIFICE	9	3	27.0000	0.1875
STATIONARY SLEEVE (INSIDE)	24	12	288.0000	2.0000
FLOW RESTRICTOR (OUTSIDE)	20	11	220.0000	1.5278
INTERSTITAL FLOW AREA			**68.0000**	**0.4722**

PEAK CONSTANT FLOW RATE 5.6963 cfs

WEIR TO ORIFICE FLOW TRANSITIONS:

Ht=(Co x Ao)/(Cw x Lw)

where:

	INNER ORIFICE	AREA BETWEEN MOVING RISER AND SLEEVE
Co = Orifice Discharge Coefficient =	0.60	0.80
Cw = Weir Discharge Coefficient =	3.2	3.2
Ao = Area of Orifice =	0.188 sq. ft.	1.468 sq. ft
Lw = Weir Length =	2.000 ft	5.667 ft
Ht =	0.141 ft	0.520 ft

Note: Area Between Moving Riser and Sleeve is area of stationary sleeve minus area of orifice plus 1/8" metal plus 1.5" angle irons on all sides of orifice per fabrication drawings.
Note: Weir Length of Area Between Moving Riser and Sleeve is the length of the perimeter of the stationary sleeve minus the width of 4 guide blocks, per

RATING CURVE

Stage (ft ASSUMED)	Inner Orifice Elevation (ft ASSUMED)	Bottom of Moving Riser Elevation (ft ASSUMED)	Flow Case Type	Differential Head on Inner Orifice (ft)	Differential Head on Interstitial Opening (ft)	Differential Head over Sleeve Rim (ft)	In-flow Over Sleeve/Rim (cfs)	Discharge Through Interstitial Opening (cfs)	Discharge Through Inner Orifice (cfs)	Total Discharge (cfs)
4.00	3.00	1.50	CASE 1	1.000000	2.500000	0.000000	0.000000	4.793463	0.902808	0.000000
4.01	3.01	1.51	CASE 1	1.000000	2.500000	0.010000	0.018133	4.793463	0.902808	0.018133
4.02	3.02	1.52	CASE 1	1.000000	2.500000	0.020000	0.051289	4.793463	0.902808	0.051289
4.03	3.03	1.53	CASE 1	1.000000	2.500000	0.030000	0.094224	4.793463	0.902808	0.094224
4.04	3.04	1.54	CASE 1	1.000000	2.500000	0.040000	0.145067	4.793463	0.902808	0.145067
4.05	3.05	1.55	CASE 1	1.000000	2.500000	0.050000	0.202737	4.793463	0.902808	0.202737
4.06	3.06	1.56	CASE 1	1.000000	2.500000	0.060000	0.266504	4.793463	0.902808	0.266504
4.07	3.07	1.57	CASE 1	1.000000	2.500000	0.070000	0.335834	4.793463	0.902808	0.335834
4.08	3.08	1.58	CASE 1	1.000000	2.500000	0.080000	0.410310	4.793463	0.902808	0.410310
4.09	3.09	1.59	CASE 1	1.000000	2.500000	0.090000	0.489600	4.793463	0.902808	0.489600
4.10	3.10	1.60	CASE 1	1.000000	2.500000	0.100000	0.573426	4.793463	0.902808	0.573426
4.11	3.11	1.61	CASE 1	1.000000	2.500000	0.110000	0.661556	4.793463	0.902808	0.661556
4.12	3.12	1.62	CASE 1	1.000000	2.500000	0.120000	0.753789	4.793463	0.902808	0.753789
4.13	3.13	1.63	CASE 1	1.000000	2.500000	0.130000	0.849949	4.793463	0.902808	0.849949
4.14	3.14	1.64	CASE 1	1.000000	2.500000	0.140000	0.949882	4.793463	0.902808	0.949882
4.15	3.15	1.65	CASE 1	1.000000	2.500000	0.150000	1.053451	4.793463	0.902808	1.053451
4.16	3.16	1.66	CASE 1	1.000000	2.500000	0.160000	1.160533	4.793463	0.902808	1.160533
4.17	3.17	1.67	CASE 1	1.000000	2.500000	0.170000	1.271016	4.793463	0.902808	1.271016
4.18	3.18	1.68	CASE 1	1.000000	2.500000	0.180000	1.384798	4.793463	0.902808	1.384798
4.19	3.19	1.69	CASE 1	1.000000	2.500000	0.190000	1.501786	4.793463	0.902808	1.501786
4.20	3.20	1.70	CASE 1	1.000000	2.500000	0.200000	1.621895	4.793463	0.902808	1.621895
4.21	3.21	1.71	CASE 1	1.000000	2.500000	0.210000	1.745045	4.793463	0.902808	1.745045
4.22	3.22	1.72	CASE 1	1.000000	2.500000	0.220000	1.871163	4.793463	0.902808	1.871163
4.23	3.23	1.73	CASE 1	1.000000	2.500000	0.230000	2.000181	4.793463	0.902808	2.000181
4.24	3.24	1.74	CASE 1	1.000000	2.500000	0.240000	2.132036	4.793463	0.902808	2.132036
4.25	3.25	1.75	CASE 1	1.000000	2.500000	0.250000	2.266667	4.793463	0.902808	2.266667
4.26	3.26	1.76	CASE 1	1.000000	2.500000	0.260000	2.404018	4.793463	0.902808	2.404018
4.27	3.27	1.77	CASE 1	1.000000	2.500000	0.270000	2.544036	4.793463	0.902808	2.544036
4.28	3.28	1.78	CASE 1	1.000000	2.500000	0.280000	2.686672	4.793463	0.902808	2.686672
4.29	3.29	1.79	CASE 1	1.000000	2.500000	0.290000	2.831879	4.793463	0.902808	2.831879
4.30	3.30	1.80	CASE 1	1.000000	2.500000	0.300000	2.979611	4.793463	0.902808	2.979611
4.31	3.31	1.81	CASE 1	1.000000	2.500000	0.310000	3.129826	4.793463	0.902808	3.129826
4.32	3.32	1.82	CASE 1	1.000000	2.500000	0.320000	3.282484	4.793463	0.902808	3.282484
4.33	3.33	1.83	CASE 1	1.000000	2.500000	0.330000	3.437546	4.793463	0.902808	3.437546
4.34	3.34	1.84	CASE 1	1.000000	2.500000	0.340000	3.594976	4.793463	0.902808	3.594976
4.35	3.35	1.85	CASE 1	1.000000	2.500000	0.350000	3.754739	4.793463	0.902808	3.754739
4.36	3.36	1.86	CASE 1	1.000000	2.500000	0.360000	3.916800	4.793463	0.902808	3.916800
4.37	3.37	1.87	CASE 1	1.000000	2.500000	0.370000	4.081128	4.793463	0.902808	4.081128
4.38	3.38	1.88	CASE 1	1.000000	2.500000	0.380000	4.247692	4.793463	0.902808	4.247692
4.39	3.39	1.89	CASE 1	1.000000	2.500000	0.390000	4.416463	4.793463	0.902808	4.416463
4.40	3.40	1.90	CASE 1	1.000000	2.500000	0.400000	4.587411	4.793463	0.902808	4.587411
4.41	3.41	1.91	CASE 1	1.000000	2.500000	0.410000	4.760509	4.793463	0.902808	4.760509
4.42	3.42	1.92	CASE 1	1.000000	2.500000	0.420000	4.935732	4.793463	0.902808	4.935732
4.43	3.43	1.93	CASE 1	1.000000	2.500000	0.430000	5.113053	4.793463	0.902808	5.113053
4.44	3.44	1.94	CASE 1	1.000000	2.500000	0.440000	5.292449	4.793463	0.902808	5.292449
4.45	3.45	1.95	CASE 1	1.000000	2.500000	0.450000	5.473894	4.793463	0.902808	5.473894
4.46	3.46	1.96	CASE 1	1.000000	2.500000	0.460000	5.657368	4.793463	0.902808	5.657368
4.47	3.47	1.97	CASE 1	1.000000	2.500000	0.470000	5.842846	4.793463	0.902808	5.696271
4.48	3.48	1.98	CASE 1	1.000000	2.500000	0.480000	6.030308	4.793463	0.902808	5.696271
4.49	3.49	1.99	CASE 1	1.000000	2.500000	0.490000	6.219733	4.793463	0.902808	5.696271
4.50	3.50	2.00	CASE 1	1.000000	2.500000	0.500000	6.411101	4.793463	0.902808	5.696271
4.51	3.51	2.01	CASE 1	1.000000	2.500000	0.510000	6.604393	4.793463	0.902808	5.696271
4.52	3.52	2.02	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.53	3.53	2.03	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.54	3.54	2.04	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.55	3.55	2.05	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.56	3.56	2.06	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.57	3.57	2.07	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.58	3.58	2.08	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.59	3.59	2.09	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.60	3.60	2.10	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.61	3.61	2.11	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.62	3.62	2.12	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.63	3.63	2.13	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.64	3.64	2.14	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.65	3.65	2.15	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.66	3.66	2.16	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.67	3.67	2.17	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.68	3.68	2.18	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.69	3.69	2.19	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.70	3.70	2.20	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.71	3.71	2.21	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.72	3.72	2.22	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.73	3.73	2.23	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.74	3.74	2.24	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.75	3.75	2.25	CASE 1	1.000000	2.500000	0.750000	8.163626	4.793463	0.902808	5.696271
4.76	3.76	2.26	CASE 1	1.000000	2.500000	0.760000	8.217869	4.793463	0.902808	5.696271
4.77	3.77	2.27	CASE 1	1.000000	2.500000	0.770000	8.271758	4.793463	0.902808	5.696271
4.78	3.78	2.28	CASE 1	1.000000	2.500000	0.780000	8.325297	4.793463	0.902808	5.696271
4.79	3.79	2.29	CASE 1	1.000000	2.500000	0.790000	8.378495	4.793463	0.902808	5.696271
4.80	3.80	2.30	CASE 1	1.000000	2.500000	0.800000	8.431356	4.793463	0.902808	5.696271
4.81	3.81	2.31	CASE 1	1.000000	2.500000	0.810000	8.483889	4.793463	0.902808	5.696271
4.82	3.82	2.32	CASE 1	1.000000	2.500000	0.820000	8.536098	4.793463	0.902808	5.696271
4.83	3.83	2.33	CASE 1	1.000000	2.500000	0.830000	8.587989	4.793463	0.902808	5.696271

RATING CURVE

Stage (ft ASSUMED)	Inner Orifice Elevation (ft ASSUMED)	Bottom of Moving Riser Elevation (ft ASSUMED)	Flow Case Type	Differential Head on Inner Orifice (ft)	Differential Head on Interstitial Opening (ft)	Differential Head over Sleeve Rim (ft)	In-flow Over Sleeve/Rim (cfs)	Discharge Through Interstitial Opening (cfs)	Discharge Through Inner Orifice (cfs)	Total Discharge (cfs)
4.84	3.84	2.34	CASE 1	1.000000	2.500000	0.840000	8.639569	4.793463	0.902808	5.696271
4.85	3.85	2.35	CASE 1	1.000000	2.500000	0.850000	8.690843	4.793463	0.902808	5.696271
4.86	3.86	2.36	CASE 1	1.000000	2.500000	0.860000	8.741816	4.793463	0.902808	5.696271
4.87	3.87	2.37	CASE 1	1.000000	2.500000	0.870000	8.792494	4.793463	0.902808	5.696271
4.88	3.88	2.38	CASE 1	1.000000	2.500000	0.880000	8.842881	4.793463	0.902808	5.696271
4.89	3.89	2.39	CASE 1	1.000000	2.500000	0.890000	8.892983	4.793463	0.902808	5.696271
4.90	3.90	2.40	CASE 1	1.000000	2.500000	0.900000	8.942804	4.793463	0.902808	5.696271
4.91	3.91	2.41	CASE 1	1.000000	2.500000	0.910000	8.992349	4.793463	0.902808	5.696271
4.92	3.92	2.42	CASE 1	1.000000	2.500000	0.920000	9.041622	4.793463	0.902808	5.696271
4.93	3.93	2.43	CASE 1	1.000000	2.500000	0.930000	9.090629	4.793463	0.902808	5.696271
4.94	3.94	2.44	CASE 1	1.000000	2.500000	0.940000	9.139372	4.793463	0.902808	5.696271
4.95	3.95	2.45	CASE 1	1.000000	2.500000	0.950000	9.187857	4.793463	0.902808	5.696271
4.96	3.96	2.46	CASE 1	1.000000	2.500000	0.960000	9.236088	4.793463	0.902808	5.696271
4.97	3.97	2.47	CASE 1	1.000000	2.500000	0.970000	9.284068	4.793463	0.902808	5.696271
4.98	3.98	2.48	CASE 1	1.000000	2.500000	0.980000	9.331801	4.793463	0.902808	5.696271
4.99	3.99	2.49	CASE 1	1.000000	2.500000	0.990000	9.379292	4.793463	0.902808	5.696271
5.00	4.00	2.50	CASE 1	1.000000	2.500000	1.000000	9.426543	4.793463	0.902808	5.696271
5.01	4.01	2.51	CASE 1	1.000000	2.500000	1.010000	9.473558	4.793463	0.902808	5.696271
5.02	4.02	2.52	CASE 1	1.000000	2.500000	1.020000	9.520342	4.793463	0.902808	5.696271
5.03	4.03	2.53	CASE 1	1.000000	2.500000	1.030000	9.566896	4.793463	0.902808	5.696271
5.04	4.04	2.54	CASE 1	1.000000	2.500000	1.040000	9.613225	4.793463	0.902808	5.696271
5.05	4.05	2.55	CASE 1	1.000000	2.500000	1.050000	9.659332	4.793463	0.902808	5.696271
5.06	4.06	2.56	CASE 1	1.000000	2.500000	1.060000	9.705220	4.793463	0.902808	5.696271
5.07	4.07	2.57	CASE 1	1.000000	2.500000	1.070000	9.750892	4.793463	0.902808	5.696271
5.08	4.08	2.58	CASE 1	1.000000	2.500000	1.080000	9.796351	4.793463	0.902808	5.696271
5.09	4.09	2.59	CASE 1	1.000000	2.500000	1.090000	9.841600	4.793463	0.902808	5.696271
5.10	4.10	2.60	CASE 1	1.000000	2.500000	1.100000	9.886641	4.793463	0.902808	5.696271
5.11	4.11	2.61	CASE 1	1.000000	2.500000	1.110000	9.931479	4.793463	0.902808	5.696271
5.12	4.12	2.62	CASE 1	1.000000	2.500000	1.120000	9.976115	4.793463	0.902808	5.696271
5.13	4.13	2.63	CASE 1	1.000000	2.500000	1.130000	10.020552	4.793463	0.902808	5.696271
5.14	4.14	2.64	CASE 1	1.000000	2.500000	1.140000	10.064794	4.793463	0.902808	5.696271
5.15	4.15	2.65	CASE 1	1.000000	2.500000	1.150000	10.108841	4.793463	0.902808	5.696271
5.16	4.16	2.66	CASE 1	1.000000	2.500000	1.160000	10.152697	4.793463	0.902808	5.696271
5.17	4.17	2.67	CASE 1	1.000000	2.500000	1.170000	10.196365	4.793463	0.902808	5.696271
5.18	4.18	2.68	CASE 1	1.000000	2.500000	1.180000	10.239847	4.793463	0.902808	5.696271
5.19	4.19	2.69	CASE 1	1.000000	2.500000	1.190000	10.283144	4.793463	0.902808	5.696271
5.20	4.20	2.70	CASE 1	1.000000	2.500000	1.200000	10.326260	4.793463	0.902808	5.696271
5.21	4.21	2.71	CASE 1	1.000000	2.500000	1.210000	10.369197	4.793463	0.902808	5.696271
5.22	4.22	2.72	CASE 1	1.000000	2.500000	1.220000	10.411957	4.793463	0.902808	5.696271
5.23	4.23	2.73	CASE 1	1.000000	2.500000	1.230000	10.454542	4.793463	0.902808	5.696271
5.24	4.24	2.74	CASE 1	1.000000	2.500000	1.240000	10.496954	4.793463	0.902808	5.696271
5.25	4.25	2.75	CASE 1	1.000000	2.500000	1.250000	10.539195	4.793463	0.902808	5.696271
5.26	4.26	2.76	CASE 1	1.000000	2.500000	1.260000	10.581268	4.793463	0.902808	5.696271
5.27	4.27	2.77	CASE 1	1.000000	2.500000	1.270000	10.623174	4.793463	0.902808	5.696271
5.28	4.28	2.78	CASE 1	1.000000	2.500000	1.280000	10.664916	4.793463	0.902808	5.696271
5.29	4.29	2.79	CASE 1	1.000000	2.500000	1.290000	10.706495	4.793463	0.902808	5.696271
5.30	4.30	2.80	CASE 1	1.000000	2.500000	1.300000	10.747912	4.793463	0.902808	5.696271
5.31	4.31	2.81	CASE 1	1.000000	2.500000	1.310000	10.789171	4.793463	0.902808	5.696271
5.32	4.32	2.82	CASE 1	1.000000	2.500000	1.320000	10.830273	4.793463	0.902808	5.696271
5.33	4.33	2.83	CASE 1	1.000000	2.500000	1.330000	10.871219	4.793463	0.902808	5.696271
5.34	4.34	2.84	CASE 1	1.000000	2.500000	1.340000	10.912012	4.793463	0.902808	5.696271
5.35	4.35	2.85	CASE 1	1.000000	2.500000	1.350000	10.952653	4.793463	0.902808	5.696271
5.36	4.36	2.86	CASE 1	1.000000	2.500000	1.360000	10.993144	4.793463	0.902808	5.696271
5.37	4.37	2.87	CASE 1	1.000000	2.500000	1.370000	11.033485	4.793463	0.902808	5.696271
5.38	4.38	2.88	CASE 1	1.000000	2.500000	1.380000	11.073680	4.793463	0.902808	5.696271
5.39	4.39	2.89	CASE 1	1.000000	2.500000	1.390000	11.113730	4.793463	0.902808	5.696271
5.40	4.40	2.90	CASE 1	1.000000	2.500000	1.400000	11.153636	4.793463	0.902808	5.696271
5.41	4.41	2.91	CASE 1	1.000000	2.500000	1.410000	11.193399	4.793463	0.902808	5.696271
5.42	4.42	2.92	CASE 1	1.000000	2.500000	1.420000	11.233022	4.793463	0.902808	5.696271
5.43	4.43	2.93	CASE 1	1.000000	2.500000	1.430000	11.272506	4.793463	0.902808	5.696271
5.44	4.44	2.94	CASE 1	1.000000	2.500000	1.440000	11.311851	4.793463	0.902808	5.696271
5.45	4.45	2.95	CASE 1	1.000000	2.500000	1.450000	11.351061	4.793463	0.902808	5.696271
5.46	4.46	2.96	CASE 1	1.000000	2.500000	1.460000	11.390135	4.793463	0.902808	5.696271
5.47	4.47	2.97	CASE 1	1.000000	2.500000	1.470000	11.429076	4.793463	0.902808	5.696271
5.48	4.48	2.98	CASE 1	1.000000	2.500000	1.480000	11.467884	4.793463	0.902808	5.696271
5.49	4.49	2.99	CASE 1	1.000000	2.500000	1.490000	11.506562	4.793463	0.902808	5.696271
5.50	4.50	3.00	CASE 1	1.000000	2.500000	1.500000	11.545110	4.793463	0.902808	5.696271
5.51	4.51	3.01	CASE 1	1.000000	2.500000	1.510000	11.583530	4.793463	0.902808	5.696271
5.52	4.52	3.02	CASE 1	1.000000	2.500000	1.520000	11.621822	4.793463	0.902808	5.696271
5.53	4.53	3.03	CASE 1	1.000000	2.500000	1.530000	11.659989	4.793463	0.902808	5.696271
5.54	4.54	3.04	CASE 1	1.000000	2.500000	1.540000	11.698032	4.793463	0.902808	5.696271
5.55	4.55	3.05	CASE 1	1.000000	2.500000	1.550000	11.735951	4.793463	0.902808	5.696271
5.56	4.56	3.06	CASE 1	1.000000	2.500000	1.560000	11.773748	4.793463	0.902808	5.696271
5.57	4.57	3.07	CASE 1	1.000000	2.500000	1.570000	11.811424	4.793463	0.902808	5.696271
5.58	4.58	3.08	CASE 1	1.000000	2.500000	1.580000	11.848981	4.793463	0.902808	5.696271
5.59	4.59	3.09	CASE 1	1.000000	2.500000	1.590000	11.886418	4.793463	0.902808	5.696271
5.60	4.60	3.10	CASE 1	1.000000	2.500000	1.600000	11.923738	4.793463	0.902808	5.696271
5.61	4.61	3.11	CASE 1	1.000000	2.500000	1.610000	11.960942	4.793463	0.902808	5.696271
5.62	4.62	3.12	CASE 1	1.000000	2.500000	1.620000	11.998030	4.793463	0.902808	5.696271
5.63	4.63	3.13	CASE 1	1.000000	2.500000	1.630000	12.035004	4.793463	0.902808	5.696271
5.64	4.64	3.14	CASE 1	1.000000	2.500000	1.640000	12.071865	4.793463	0.902808	5.696271
5.65	4.65	3.15	CASE 1	1.000000	2.500000	1.650000	12.108613	4.793463	0.902808	5.696271
5.66	4.66	3.16	CASE 1	1.000000	2.500000	1.660000	12.145251	4.793463	0.902808	5.696271
5.67	4.67	3.17	CASE 1	1.000000	2.500000	1.670000	12.181778	4.793463	0.902808	5.696271

RATING CURVE

Stage (ft ASSUMED)	Inner Orifice Elevation (ft ASSUMED)	Bottom of Moving Riser Elevation (ft ASSUMED)	Flow Case Type	Differential Head on Inner Orifice (ft)	Differential Head on Interstitial Opening (ft)	Differential Head over Sleeve Rim (ft)	In-flow Over Sleeve/Rim (cfs)	Discharge Through Interstitial Opening (cfs)	Discharge Through Inner Orifice (cfs)	Total Discharge (cfs)
5.68	4.68	3.18	CASE 1	1.000000	2.500000	1.680000	12.218196	4.793463	0.902808	5.696271
5.69	4.69	3.19	CASE 1	1.000000	2.500000	1.690000	12.254506	4.793463	0.902808	5.696271
5.70	4.70	3.20	CASE 1	1.000000	2.500000	1.700000	12.290708	4.793463	0.902808	5.696271
5.71	4.71	3.21	CASE 1	1.000000	2.500000	1.710000	12.326804	4.793463	0.902808	5.696271
5.72	4.72	3.22	CASE 1	1.000000	2.500000	1.720000	12.362795	4.793463	0.902808	5.696271
5.73	4.73	3.23	CASE 1	1.000000	2.500000	1.730000	12.398681	4.793463	0.902808	5.696271
5.74	4.74	3.24	CASE 1	1.000000	2.500000	1.740000	12.434464	4.793463	0.902808	5.696271
5.75	4.75	3.25	CASE 1	1.000000	2.500000	1.750000	12.470144	4.793463	0.902808	5.696271
5.76	4.76	3.26	CASE 1	1.000000	2.500000	1.760000	12.505722	4.793463	0.902808	5.696271
5.77	4.77	3.27	CASE 1	1.000000	2.500000	1.770000	12.541200	4.793463	0.902808	5.696271
5.78	4.78	3.28	CASE 1	1.000000	2.500000	1.780000	12.576577	4.793463	0.902808	5.696271
5.79	4.79	3.29	CASE 1	1.000000	2.500000	1.790000	12.611855	4.793463	0.902808	5.696271
5.80	4.80	3.30	CASE 1	1.000000	2.500000	1.800000	12.647034	4.793463	0.902808	5.696271
5.81	4.81	3.31	CASE 1	1.000000	2.500000	1.810000	12.682116	4.793463	0.902808	5.696271
5.82	4.82	3.32	CASE 1	1.000000	2.500000	1.820000	12.717102	4.793463	0.902808	5.696271
5.83	4.83	3.33	CASE 1	1.000000	2.500000	1.830000	12.751991	4.793463	0.902808	5.696271
5.84	4.84	3.34	CASE 1	1.000000	2.500000	1.840000	12.786785	4.793463	0.902808	5.696271
5.85	4.85	3.35	CASE 1	1.000000	2.500000	1.850000	12.821484	4.793463	0.902808	5.696271
5.86	4.86	3.36	CASE 1	1.000000	2.500000	1.860000	12.856090	4.793463	0.902808	5.696271
5.87	4.87	3.37	CASE 1	1.000000	2.500000	1.870000	12.890603	4.793463	0.902808	5.696271
5.88	4.88	3.38	CASE 1	1.000000	2.500000	1.880000	12.925024	4.793463	0.902808	5.696271
5.89	4.89	3.39	CASE 1	1.000000	2.500000	1.890000	12.959354	4.793463	0.902808	5.696271
5.90	4.90	3.40	CASE 1	1.000000	2.500000	1.900000	12.993593	4.793463	0.902808	5.696271
5.91	4.91	3.41	CASE 1	1.000000	2.500000	1.910000	13.027741	4.793463	0.902808	5.696271
5.92	4.92	3.42	CASE 1	1.000000	2.500000	1.920000	13.061801	4.793463	0.902808	5.696271
5.93	4.93	3.43	CASE 1	1.000000	2.500000	1.930000	13.095772	4.793463	0.902808	5.696271
5.94	4.94	3.44	CASE 1	1.000000	2.500000	1.940000	13.129655	4.793463	0.902808	5.696271
5.95	4.95	3.45	CASE 1	1.000000	2.500000	1.950000	13.163451	4.793463	0.902808	5.696271
5.96	4.96	3.46	CASE 1	1.000000	2.500000	1.960000	13.197160	4.793463	0.902808	5.696271
5.97	4.97	3.47	CASE 1	1.000000	2.500000	1.970000	13.230783	4.793463	0.902808	5.696271
5.98	4.98	3.48	CASE 1	1.000000	2.500000	1.980000	13.264321	4.793463	0.902808	5.696271
5.99	4.99	3.49	CASE 1	1.000000	2.500000	1.990000	13.297775	4.793463	0.902808	5.696271
6.00	5.00	3.50	CASE 1	1.000000	2.500000	2.000000	13.331145	4.793463	0.902808	5.696271
6.01	5.01	3.51	CASE 1	1.000000	2.500000	2.010000	13.364431	4.793463	0.902808	5.696271
6.02	5.02	3.52	CASE 1	1.000000	2.500000	2.020000	13.397635	4.793463	0.902808	5.696271
6.03	5.03	3.53	CASE 1	1.000000	2.500000	2.030000	13.430756	4.793463	0.902808	5.696271
6.04	5.04	3.54	CASE 1	1.000000	2.500000	2.040000	13.463796	4.793463	0.902808	5.696271
6.05	5.05	3.55	CASE 1	1.000000	2.500000	2.050000	13.496755	4.793463	0.902808	5.696271
6.06	5.06	3.56	CASE 1	1.000000	2.500000	2.060000	13.529634	4.793463	0.902808	5.696271
6.07	5.07	3.57	CASE 1	1.000000	2.500000	2.070000	13.562433	4.793463	0.902808	5.696271
6.08	5.08	3.58	CASE 1	1.000000	2.500000	2.080000	13.595153	4.793463	0.902808	5.696271
6.09	5.09	3.59	CASE 1	1.000000	2.500000	2.090000	13.627795	4.793463	0.902808	5.696271
6.10	5.10	3.60	CASE 1	1.000000	2.500000	2.100000	13.660358	4.793463	0.902808	5.696271
6.11	5.11	3.61	CASE 1	1.000000	2.500000	2.110000	13.692844	4.793463	0.902808	5.696271
6.12	5.12	3.62	CASE 1	1.000000	2.500000	2.120000	13.725253	4.793463	0.902808	5.696271
6.13	5.13	3.63	CASE 1	1.000000	2.500000	2.130000	13.757586	4.793463	0.902808	5.696271
6.14	5.14	3.64	CASE 1	1.000000	2.500000	2.140000	13.789843	4.793463	0.902808	5.696271
6.15	5.15	3.65	CASE 1	1.000000	2.500000	2.150000	13.822025	4.793463	0.902808	5.696271
6.16	5.16	3.66	CASE 1	1.000000	2.500000	2.160000	13.854132	4.793463	0.902808	5.696271
6.17	5.17	3.67	CASE 1	1.000000	2.500000	2.170000	13.886165	4.793463	0.902808	5.696271
6.18	5.18	3.68	CASE 1	1.000000	2.500000	2.180000	13.918124	4.793463	0.902808	5.696271
6.19	5.19	3.69	CASE 1	1.000000	2.500000	2.190000	13.950009	4.793463	0.902808	5.696271
6.20	5.20	3.70	CASE 1	1.000000	2.500000	2.200000	13.981822	4.793463	0.902808	5.696271
6.21	5.21	3.71	CASE 1	1.000000	2.500000	2.210000	14.013563	4.793463	0.902808	5.696271
6.22	5.22	3.72	CASE 1	1.000000	2.500000	2.220000	14.045232	4.793463	0.902808	5.696271
6.23	5.23	3.73	CASE 1	1.000000	2.500000	2.230000	14.076830	4.793463	0.902808	5.696271
6.24	5.24	3.74	CASE 1	1.000000	2.500000	2.240000	14.108357	4.793463	0.902808	5.696271
6.25	5.25	3.75	CASE 1	1.000000	2.500000	2.250000	14.139814	4.793463	0.902808	5.696271
6.26	5.26	3.76	CASE 1	1.000000	2.500000	2.260000	14.171201	4.793463	0.902808	5.696271
6.27	5.27	3.77	CASE 1	1.000000	2.500000	2.270000	14.202519	4.793463	0.902808	5.696271
6.28	5.28	3.78	CASE 1	1.000000	2.500000	2.280000	14.233767	4.793463	0.902808	5.696271
6.29	5.29	3.79	CASE 1	1.000000	2.500000	2.290000	14.264948	4.793463	0.902808	5.696271
6.30	5.30	3.80	CASE 1	1.000000	2.500000	2.300000	14.296060	4.793463	0.902808	5.696271
6.31	5.31	3.81	CASE 1	1.000000	2.500000	2.310000	14.327105	4.793463	0.902808	5.696271
6.32	5.32	3.82	CASE 1	1.000000	2.500000	2.320000	14.358082	4.793463	0.902808	5.696271
6.33	5.33	3.83	CASE 1	1.000000	2.500000	2.330000	14.388993	4.793463	0.902808	5.696271
6.34	5.34	3.84	CASE 1	1.000000	2.500000	2.340000	14.419838	4.793463	0.902808	5.696271
6.35	5.35	3.85	CASE 1	1.000000	2.500000	2.350000	14.450616	4.793463	0.902808	5.696271
6.36	5.36	3.86	CASE 1	1.000000	2.500000	2.360000	14.481330	4.793463	0.902808	5.696271
6.37	5.37	3.87	CASE 1	1.000000	2.500000	2.370000	14.511978	4.793463	0.902808	5.696271
6.38	5.38	3.88	CASE 1	1.000000	2.500000	2.380000	14.542562	4.793463	0.902808	5.696271
6.39	5.39	3.89	CASE 1	1.000000	2.500000	2.390000	14.573082	4.793463	0.902808	5.696271
6.40	5.40	3.90	CASE 1	1.000000	2.500000	2.400000	14.603537	4.793463	0.902808	5.696271
6.41	5.41	3.91	CASE 1	1.000000	2.500000	2.410000	14.633930	4.793463	0.902808	5.696271
6.42	5.42	3.92	CASE 1	1.000000	2.500000	2.420000	14.664259	4.793463	0.902808	5.696271
6.43	5.43	3.93	CASE 1	1.000000	2.500000	2.430000	14.694526	4.793463	0.902808	5.696271
6.44	5.44	3.94	CASE 1	1.000000	2.500000	2.440000	14.724731	4.793463	0.902808	5.696271
6.45	5.45	3.95	CASE 1	1.000000	2.500000	2.450000	14.754873	4.793463	0.902808	5.696271
6.46	5.46	3.96	CASE 1	1.000000	2.500000	2.460000	14.784955	4.793463	0.902808	5.696271
6.47	5.47	3.97	CASE 1	1.000000	2.500000	2.470000	14.814975	4.793463	0.902808	5.696271
6.48	5.48	3.98	CASE 1	1.000000	2.500000	2.480000	14.844934	4.793463	0.902808	5.696271
6.49	5.49	3.99	CASE 1	1.000000	2.500000	2.490000	14.874834	4.793463	0.902808	5.696271
6.50	5.50	4.00	CASE 1	1.000000	2.500000	2.500000	14.904673	4.793463	0.902808	5.696271
6.51	5.51	4.01	CASE 1	1.000000	2.500000	2.510000	14.934452	4.793463	0.902808	5.696271

RATING CURVE

Stage (ft ASSUMED)	Inner Orifice Elevation (ft ASSUMED)	Bottom of Moving Riser Elevation (ft ASSUMED)	Flow Case Type	Differential Head on Inner Orifice (ft)	Differential Head on Interstitial Opening (ft)	Differential Head over Sleeve Rim (ft)	In-flow Over Sleeve/Rim (cfs)	Discharge Through Interstitial Opening (cfs)	Discharge Through Inner Orifice (cfs)	Total Discharge (cfs)
6.52	5.52	4.02	CASE 1	1.000000	2.500000	2.520000	14.964173	4.793463	0.902808	5.696271
6.53	5.53	4.03	CASE 1	1.000000	2.500000	2.530000	14.993834	4.793463	0.902808	5.696271
6.54	5.54	4.04	CASE 1	1.000000	2.500000	2.540000	15.023437	4.793463	0.902808	5.696271
6.55	5.55	4.05	CASE 1	1.000000	2.500000	2.550000	15.052982	4.793463	0.902808	5.696271
6.56	5.56	4.06	CASE 1	1.000000	2.500000	2.560000	15.082468	4.793463	0.902808	5.696271
6.57	5.57	4.07	CASE 1	1.000000	2.500000	2.570000	15.111898	4.793463	0.902808	5.696271
6.58	5.58	4.08	CASE 1	1.000000	2.500000	2.580000	15.141270	4.793463	0.902808	5.696271
6.59	5.59	4.09	CASE 1	1.000000	2.500000	2.590000	15.170585	4.793463	0.902808	5.696271
6.60	5.60	4.10	CASE 1	1.000000	2.500000	2.600000	15.199844	4.793463	0.902808	5.696271
6.61	5.61	4.11	CASE 1	1.000000	2.500000	2.610000	15.229046	4.793463	0.902808	5.696271
6.62	5.62	4.12	CASE 1	1.000000	2.500000	2.620000	15.258192	4.793463	0.902808	5.696271
6.63	5.63	4.13	CASE 1	1.000000	2.500000	2.630000	15.287283	4.793463	0.902808	5.696271
6.64	5.64	4.14	CASE 1	1.000000	2.500000	2.640000	15.316319	4.793463	0.902808	5.696271
6.65	5.65	4.15	CASE 1	1.000000	2.500000	2.650000	15.345300	4.793463	0.902808	5.696271
6.66	5.66	4.16	CASE 1	1.000000	2.500000	2.660000	15.374226	4.793463	0.902808	5.696271
6.67	5.67	4.17	CASE 1	1.000000	2.500000	2.670000	15.403098	4.793463	0.902808	5.696271
6.68	5.68	4.18	CASE 1	1.000000	2.500000	2.680000	15.431916	4.793463	0.902808	5.696271
6.69	5.69	4.19	CASE 1	1.000000	2.500000	2.690000	15.460680	4.793463	0.902808	5.696271
6.70	5.70	4.20	CASE 1	1.000000	2.500000	2.700000	15.489390	4.793463	0.902808	5.696271
6.71	5.71	4.21	CASE 1	1.000000	2.500000	2.710000	15.518048	4.793463	0.902808	5.696271
6.72	5.72	4.22	CASE 1	1.000000	2.500000	2.720000	15.546653	4.793463	0.902808	5.696271
6.73	5.73	4.23	CASE 1	1.000000	2.500000	2.730000	15.575205	4.793463	0.902808	5.696271
6.74	5.74	4.24	CASE 1	1.000000	2.500000	2.740000	15.603705	4.793463	0.902808	5.696271
6.75	5.75	4.25	CASE 1	1.000000	2.500000	2.750000	15.632153	4.793463	0.902808	5.696271
6.76	5.76	4.26	CASE 1	1.000000	2.500000	2.760000	15.660549	4.793463	0.902808	5.696271
6.77	5.77	4.27	CASE 1	1.000000	2.500000	2.770000	15.688894	4.793463	0.902808	5.696271
6.78	5.78	4.28	CASE 1	1.000000	2.500000	2.780000	15.717188	4.793463	0.902808	5.696271
6.79	5.79	4.29	CASE 1	1.000000	2.500000	2.790000	15.745431	4.793463	0.902808	5.696271
6.80	5.80	4.30	CASE 1	1.000000	2.500000	2.800000	15.773623	4.793463	0.902808	5.696271
6.81	5.81	4.31	CASE 1	1.000000	2.500000	2.810000	15.801765	4.793463	0.902808	5.696271
6.82	5.82	4.32	CASE 1	1.000000	2.500000	2.820000	15.829857	4.793463	0.902808	5.696271
6.83	5.83	4.33	CASE 1	1.000000	2.500000	2.830000	15.857900	4.793463	0.902808	5.696271
6.84	5.84	4.34	CASE 1	1.000000	2.500000	2.840000	15.885892	4.793463	0.902808	5.696271
6.85	5.85	4.35	CASE 1	1.000000	2.500000	2.850000	15.913836	4.793463	0.902808	5.696271
6.86	5.86	4.36	CASE 1	1.000000	2.500000	2.860000	15.941730	4.793463	0.902808	5.696271
6.87	5.87	4.37	CASE 1	1.000000	2.500000	2.870000	15.969576	4.793463	0.902808	5.696271
6.88	5.88	4.38	CASE 1	1.000000	2.500000	2.880000	15.997374	4.793463	0.902808	5.696271
6.89	5.89	4.39	CASE 1	1.000000	2.500000	2.890000	16.025123	4.793463	0.902808	5.696271
6.90	5.90	4.40	CASE 1	1.000000	2.500000	2.900000	16.052824	4.793463	0.902808	5.696271
6.91	5.91	4.41	CASE 1	1.000000	2.500000	2.910000	16.080477	4.793463	0.902808	5.696271
6.92	5.92	4.42	CASE 1	1.000000	2.500000	2.920000	16.108083	4.793463	0.902808	5.696271
6.93	5.93	4.43	CASE 1	1.000000	2.500000	2.930000	16.135642	4.793463	0.902808	5.696271
6.94	5.94	4.44	CASE 1	1.000000	2.500000	2.940000	16.163154	4.793463	0.902808	5.696271
6.95	5.95	4.45	CASE 1	1.000000	2.500000	2.950000	16.190619	4.793463	0.902808	5.696271
6.96	5.96	4.46	CASE 1	1.000000	2.500000	2.960000	16.218037	4.793463	0.902808	5.696271
6.97	5.97	4.47	CASE 1	1.000000	2.500000	2.970000	16.245410	4.793463	0.902808	5.696271
6.98	5.98	4.48	CASE 1	1.000000	2.500000	2.980000	16.272736	4.793463	0.902808	5.696271
6.99	5.99	4.49	CASE 1	1.000000	2.500000	2.990000	16.300016	4.793463	0.902808	5.696271
7.00	6.00	4.50	CASE 1	1.000000	2.500000	3.000000	16.327251	4.793463	0.902808	5.696271
7.01	6.01	4.51	CASE 1	1.000000	2.500000	3.010000	16.354441	4.793463	0.902808	5.696271
7.02	6.02	4.52	CASE 1	1.000000	2.500000	3.020000	16.381585	4.793463	0.902808	5.696271
7.03	6.03	4.53	CASE 1	1.000000	2.500000	3.030000	16.408684	4.793463	0.902808	5.696271
7.04	6.04	4.54	CASE 1	1.000000	2.500000	3.040000	16.435739	4.793463	0.902808	5.696271
7.05	6.05	4.55	CASE 1	1.000000	2.500000	3.050000	16.462749	4.793463	0.902808	5.696271
7.06	6.06	4.56	CASE 1	1.000000	2.500000	3.060000	16.489715	4.793463	0.902808	5.696271
7.07	6.07	4.57	CASE 1	1.000000	2.500000	3.070000	16.516637	4.793463	0.902808	5.696271
7.08	6.08	4.58	CASE 1	1.000000	2.500000	3.080000	16.543515	4.793463	0.902808	5.696271
7.09	6.09	4.59	CASE 1	1.000000	2.500000	3.090000	16.570350	4.793463	0.902808	5.696271
7.10	6.10	4.60	CASE 1	1.000000	2.500000	3.100000	16.597141	4.793463	0.902808	5.696271
7.11	6.11	4.61	CASE 1	1.000000	2.500000	3.110000	16.623889	4.793463	0.902808	5.696271
7.12	6.12	4.62	CASE 1	1.000000	2.500000	3.120000	16.650594	4.793463	0.902808	5.696271
7.13	6.13	4.63	CASE 1	1.000000	2.500000	3.130000	16.677257	4.793463	0.902808	5.696271
7.14	6.14	4.64	CASE 1	1.000000	2.500000	3.140000	16.703876	4.793463	0.902808	5.696271
7.15	6.15	4.65	CASE 1	1.000000	2.500000	3.150000	16.730454	4.793463	0.902808	5.696271
7.16	6.16	4.66	CASE 1	1.000000	2.500000	3.160000	16.756989	4.793463	0.902808	5.696271
7.17	6.17	4.67	CASE 1	1.000000	2.500000	3.170000	16.783482	4.793463	0.902808	5.696271
7.18	6.18	4.68	CASE 1	1.000000	2.500000	3.180000	16.809934	4.793463	0.902808	5.696271
7.19	6.19	4.69	CASE 1	1.000000	2.500000	3.190000	16.836344	4.793463	0.902808	5.696271
7.20	6.20	4.70	CASE 1	1.000000	2.500000	3.200000	16.862712	4.793463	0.902808	5.696271
7.21	6.21	4.71	CASE 1	1.000000	2.500000	3.210000	16.889040	4.793463	0.902808	5.696271
7.22	6.22	4.72	CASE 1	1.000000	2.500000	3.220000	16.915326	4.793463	0.902808	5.696271
7.23	6.23	4.73	CASE 1	1.000000	2.500000	3.230000	16.941572	4.793463	0.902808	5.696271
7.24	6.24	4.74	CASE 1	1.000000	2.500000	3.240000	16.967777	4.793463	0.902808	5.696271
7.25	6.25	4.75	CASE 1	1.000000	2.500000	3.250000	16.993942	4.793463	0.902808	5.696271
7.26	6.26	4.76	CASE 1	1.000000	2.500000	3.260000	17.020066	4.793463	0.902808	5.696271
7.27	6.27	4.77	CASE 1	1.000000	2.500000	3.270000	17.046151	4.793463	0.902808	5.696271
7.28	6.28	4.78	CASE 1	1.000000	2.500000	3.280000	17.072195	4.793463	0.902808	5.696271
7.29	6.29	4.79	CASE 1	1.000000	2.500000	3.290000	17.098200	4.793463	0.902808	5.696271
7.30	6.30	4.80	CASE 1	1.000000	2.500000	3.300000	17.124165	4.793463	0.902808	5.696271
7.31	6.31	4.81	CASE 1	1.000000	2.500000	3.310000	17.150091	4.793463	0.902808	5.696271
7.32	6.32	4.82	CASE 1	1.000000	2.500000	3.320000	17.175978	4.793463	0.902808	5.696271
7.33	6.33	4.83	CASE 1	1.000000	2.500000	3.330000	17.201826	4.793463	0.902808	5.696271
7.34	6.34	4.84	CASE 1	1.000000	2.500000	3.340000	17.227636	4.793463	0.902808	5.696271
7.35	6.35	4.85	CASE 1	1.000000	2.500000	3.350000	17.253406	4.793463	0.902808	5.696271

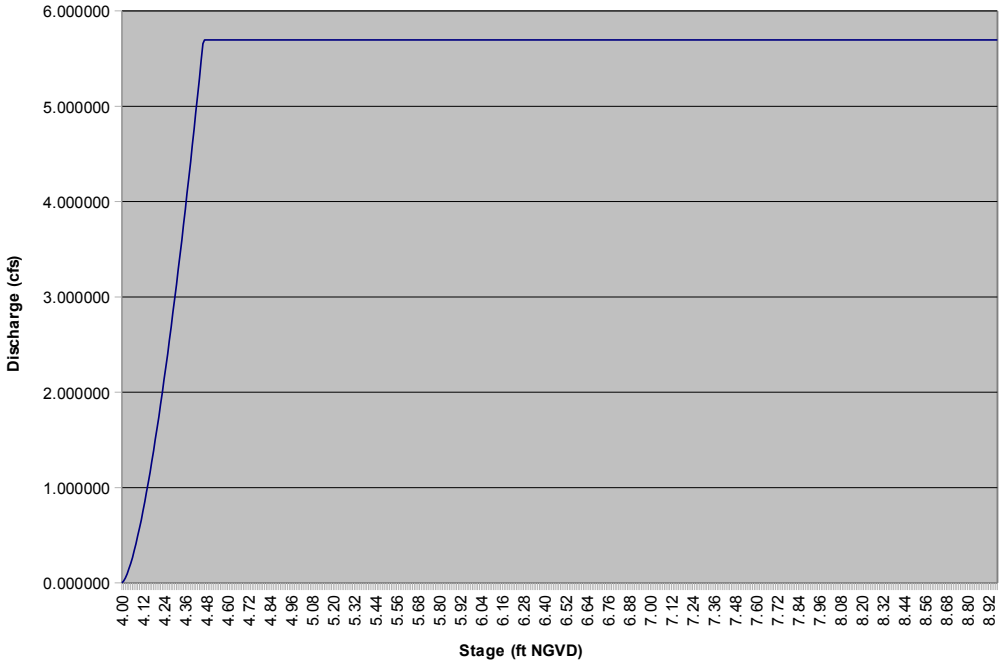
RATING CURVE

Stage (ft ASSUMED)	Inner Orifice Elevation (ft ASSUMED)	Bottom of Moving Riser Elevation (ft ASSUMED)	Flow Case Type	Differential Head on Inner Orifice (ft)	Differential Head on Interstitial Opening (ft)	Differential Head over Sleeve Rim (ft)	In-flow Over Sleeve/Rim (cfs)	Discharge Through Interstitial Opening (cfs)	Discharge Through Inner Orifice (cfs)	Total Discharge (cfs)
7.36	6.36	4.86	CASE 1	1.000000	2.500000	3.360000	17.279138	4.793463	0.902808	5.696271
7.37	6.37	4.87	CASE 1	1.000000	2.500000	3.370000	17.304832	4.793463	0.902808	5.696271
7.38	6.38	4.88	CASE 1	1.000000	2.500000	3.380000	17.330488	4.793463	0.902808	5.696271
7.39	6.39	4.89	CASE 1	1.000000	2.500000	3.390000	17.356106	4.793463	0.902808	5.696271
7.40	6.40	4.90	CASE 1	1.000000	2.500000	3.400000	17.381686	4.793463	0.902808	5.696271
7.41	6.41	4.91	CASE 1	1.000000	2.500000	3.410000	17.407229	4.793463	0.902808	5.696271
7.42	6.42	4.92	CASE 1	1.000000	2.500000	3.420000	17.432734	4.793463	0.902808	5.696271
7.43	6.43	4.93	CASE 1	1.000000	2.500000	3.430000	17.458202	4.793463	0.902808	5.696271
7.44	6.44	4.94	CASE 1	1.000000	2.500000	3.440000	17.483632	4.793463	0.902808	5.696271
7.45	6.45	4.95	CASE 1	1.000000	2.500000	3.450000	17.509026	4.793463	0.902808	5.696271
7.46	6.46	4.96	CASE 1	1.000000	2.500000	3.460000	17.534383	4.793463	0.902808	5.696271
7.47	6.47	4.97	CASE 1	1.000000	2.500000	3.470000	17.559704	4.793463	0.902808	5.696271
7.48	6.48	4.98	CASE 1	1.000000	2.500000	3.480000	17.584988	4.793463	0.902808	5.696271
7.49	6.49	4.99	CASE 1	1.000000	2.500000	3.490000	17.610235	4.793463	0.902808	5.696271
7.50	6.50	5.00	CASE 1	1.000000	2.500000	3.500000	17.635447	4.793463	0.902808	5.696271
7.51	6.51	5.01	CASE 1	1.000000	2.500000	3.510000	17.660622	4.793463	0.902808	5.696271
7.52	6.52	5.02	CASE 1	1.000000	2.500000	3.520000	17.685762	4.793463	0.902808	5.696271
7.53	6.53	5.03	CASE 1	1.000000	2.500000	3.530000	17.710866	4.793463	0.902808	5.696271
7.54	6.54	5.04	CASE 1	1.000000	2.500000	3.540000	17.735934	4.793463	0.902808	5.696271
7.55	6.55	5.05	CASE 1	1.000000	2.500000	3.550000	17.760968	4.793463	0.902808	5.696271
7.56	6.56	5.06	CASE 1	1.000000	2.500000	3.560000	17.785965	4.793463	0.902808	5.696271
7.57	6.57	5.07	CASE 1	1.000000	2.500000	3.570000	17.810928	4.793463	0.902808	5.696271
7.58	6.58	5.08	CASE 1	1.000000	2.500000	3.580000	17.835856	4.793463	0.902808	5.696271
7.59	6.59	5.09	CASE 1	1.000000	2.500000	3.590000	17.860749	4.793463	0.902808	5.696271
7.60	6.60	5.10	CASE 1	1.000000	2.500000	3.600000	17.885607	4.793463	0.902808	5.696271
7.61	6.61	5.11	CASE 1	1.000000	2.500000	3.610000	17.910431	4.793463	0.902808	5.696271
7.62	6.62	5.12	CASE 1	1.000000	2.500000	3.620000	17.935221	4.793463	0.902808	5.696271
7.63	6.63	5.13	CASE 1	1.000000	2.500000	3.630000	17.959976	4.793463	0.902808	5.696271
7.64	6.64	5.14	CASE 1	1.000000	2.500000	3.640000	17.984697	4.793463	0.902808	5.696271
7.65	6.65	5.15	CASE 1	1.000000	2.500000	3.650000	18.009385	4.793463	0.902808	5.696271
7.66	6.66	5.16	CASE 1	1.000000	2.500000	3.660000	18.034038	4.793463	0.902808	5.696271
7.67	6.67	5.17	CASE 1	1.000000	2.500000	3.670000	18.058658	4.793463	0.902808	5.696271
7.68	6.68	5.18	CASE 1	1.000000	2.500000	3.680000	18.083244	4.793463	0.902808	5.696271
7.69	6.69	5.19	CASE 1	1.000000	2.500000	3.690000	18.107797	4.793463	0.902808	5.696271
7.70	6.70	5.20	CASE 1	1.000000	2.500000	3.700000	18.132317	4.793463	0.902808	5.696271
7.71	6.71	5.21	CASE 1	1.000000	2.500000	3.710000	18.156804	4.793463	0.902808	5.696271
7.72	6.72	5.22	CASE 1	1.000000	2.500000	3.720000	18.181257	4.793463	0.902808	5.696271
7.73	6.73	5.23	CASE 1	1.000000	2.500000	3.730000	18.205678	4.793463	0.902808	5.696271
7.74	6.74	5.24	CASE 1	1.000000	2.500000	3.740000	18.230066	4.793463	0.902808	5.696271
7.75	6.75	5.25	CASE 1	1.000000	2.500000	3.750000	18.254422	4.793463	0.902808	5.696271
7.76	6.76	5.26	CASE 1	1.000000	2.500000	3.760000	18.278745	4.793463	0.902808	5.696271
7.77	6.77	5.27	CASE 1	1.000000	2.500000	3.770000	18.303035	4.793463	0.902808	5.696271
7.78	6.78	5.28	CASE 1	1.000000	2.500000	3.780000	18.327294	4.793463	0.902808	5.696271
7.79	6.79	5.29	CASE 1	1.000000	2.500000	3.790000	18.351520	4.793463	0.902808	5.696271
7.80	6.80	5.30	CASE 1	1.000000	2.500000	3.800000	18.375715	4.793463	0.902808	5.696271
7.81	6.81	5.31	CASE 1	1.000000	2.500000	3.810000	18.399877	4.793463	0.902808	5.696271
7.82	6.82	5.32	CASE 1	1.000000	2.500000	3.820000	18.424008	4.793463	0.902808	5.696271
7.83	6.83	5.33	CASE 1	1.000000	2.500000	3.830000	18.448108	4.793463	0.902808	5.696271
7.84	6.84	5.34	CASE 1	1.000000	2.500000	3.840000	18.472176	4.793463	0.902808	5.696271
7.85	6.85	5.35	CASE 1	1.000000	2.500000	3.850000	18.496213	4.793463	0.902808	5.696271
7.86	6.86	5.36	CASE 1	1.000000	2.500000	3.860000	18.520218	4.793463	0.902808	5.696271
7.87	6.87	5.37	CASE 1	1.000000	2.500000	3.870000	18.544192	4.793463	0.902808	5.696271
7.88	6.88	5.38	CASE 1	1.000000	2.500000	3.880000	18.568136	4.793463	0.902808	5.696271
7.89	6.89	5.39	CASE 1	1.000000	2.500000	3.890000	18.592049	4.793463	0.902808	5.696271
7.90	6.90	5.40	CASE 1	1.000000	2.500000	3.900000	18.615930	4.793463	0.902808	5.696271
7.91	6.91	5.41	CASE 1	1.000000	2.500000	3.910000	18.639782	4.793463	0.902808	5.696271
7.92	6.92	5.42	CASE 1	1.000000	2.500000	3.920000	18.663603	4.793463	0.902808	5.696271
7.93	6.93	5.43	CASE 1	1.000000	2.500000	3.930000	18.687393	4.793463	0.902808	5.696271
7.94	6.94	5.44	CASE 1	1.000000	2.500000	3.940000	18.711153	4.793463	0.902808	5.696271
7.95	6.95	5.45	CASE 1	1.000000	2.500000	3.950000	18.734883	4.793463	0.902808	5.696271
7.96	6.96	5.46	CASE 1	1.000000	2.500000	3.960000	18.758583	4.793463	0.902808	5.696271
7.97	6.97	5.47	CASE 1	1.000000	2.500000	3.970000	18.782253	4.793463	0.902808	5.696271
7.98	6.98	5.48	CASE 1	1.000000	2.500000	3.980000	18.805894	4.793463	0.902808	5.696271
7.99	6.99	5.49	CASE 1	1.000000	2.500000	3.990000	18.829504	4.793463	0.902808	5.696271
8.00	7.00	5.50	CASE 1	1.000000	2.500000	4.000000	18.853086	4.793463	0.902808	5.696271
8.01	7.01	5.51	CASE 1	1.000000	2.500000	4.010000	18.876637	4.793463	0.902808	5.696271
8.02	7.02	5.52	CASE 1	1.000000	2.500000	4.020000	18.900160	4.793463	0.902808	5.696271
8.03	7.03	5.53	CASE 1	1.000000	2.500000	4.030000	18.923653	4.793463	0.902808	5.696271
8.04	7.04	5.54	CASE 1	1.000000	2.500000	4.040000	18.947117	4.793463	0.902808	5.696271
8.05	7.05	5.55	CASE 1	1.000000	2.500000	4.050000	18.970551	4.793463	0.902808	5.696271
8.06	7.06	5.56	CASE 1	1.000000	2.500000	4.060000	18.993957	4.793463	0.902808	5.696271
8.07	7.07	5.57	CASE 1	1.000000	2.500000	4.070000	19.017335	4.793463	0.902808	5.696271
8.08	7.08	5.58	CASE 1	1.000000	2.500000	4.080000	19.040683	4.793463	0.902808	5.696271
8.09	7.09	5.59	CASE 1	1.000000	2.500000	4.090000	19.064003	4.793463	0.902808	5.696271
8.10	7.10	5.60	CASE 1	1.000000	2.500000	4.100000	19.087294	4.793463	0.902808	5.696271
8.11	7.11	5.61	CASE 1	1.000000	2.500000	4.110000	19.110557	4.793463	0.902808	5.696271
8.12	7.12	5.62	CASE 1	1.000000	2.500000	4.120000	19.133792	4.793463	0.902808	5.696271
8.13	7.13	5.63	CASE 1	1.000000	2.500000	4.130000	19.156999	4.793463	0.902808	5.696271
8.14	7.14	5.64	CASE 1	1.000000	2.500000	4.140000	19.180177	4.793463	0.902808	5.696271
8.15	7.15	5.65	CASE 1	1.000000	2.500000	4.150000	19.203328	4.793463	0.902808	5.696271
8.16	7.16	5.66	CASE 1	1.000000	2.500000	4.160000	19.226450	4.793463	0.902808	5.696271
8.17	7.17	5.67	CASE 1	1.000000	2.500000	4.170000	19.249545	4.793463	0.902808	5.696271
8.18	7.18	5.68	CASE 1	1.000000	2.500000	4.180000	19.272612	4.793463	0.902808	5.696271
8.19	7.19	5.69	CASE 1	1.000000	2.500000	4.190000	19.295652	4.793463	0.902808	5.696271

RATING CURVE

Stage (ft ASSUMED)	Inner Orifice Elevation (ft ASSUMED)	Bottom of Moving Riser Elevation (ft ASSUMED)	Flow Case Type	Differential Head on Inner Orifice (ft)	Differential Head on Interstitial Opening (ft)	Differential Head over Sleeve Rim (ft)	In-flow Over Sleeve/Rim (cfs)	Discharge Through Interstitial Opening (cfs)	Discharge Through Inner Orifice (cfs)	Total Discharge (cfs)
8.20	7.20	5.70	CASE 1	1.000000	2.500000	4.200000	19.318664	4.793463	0.902808	5.696271
8.21	7.21	5.71	CASE 1	1.000000	2.500000	4.210000	19.341649	4.793463	0.902808	5.696271
8.22	7.22	5.72	CASE 1	1.000000	2.500000	4.220000	19.364606	4.793463	0.902808	5.696271
8.23	7.23	5.73	CASE 1	1.000000	2.500000	4.230000	19.387536	4.793463	0.902808	5.696271
8.24	7.24	5.74	CASE 1	1.000000	2.500000	4.240000	19.410440	4.793463	0.902808	5.696271
8.25	7.25	5.75	CASE 1	1.000000	2.500000	4.250000	19.433316	4.793463	0.902808	5.696271
8.26	7.26	5.76	CASE 1	1.000000	2.500000	4.260000	19.456165	4.793463	0.902808	5.696271
8.27	7.27	5.77	CASE 1	1.000000	2.500000	4.270000	19.478988	4.793463	0.902808	5.696271
8.28	7.28	5.78	CASE 1	1.000000	2.500000	4.280000	19.501783	4.793463	0.902808	5.696271
8.29	7.29	5.79	CASE 1	1.000000	2.500000	4.290000	19.524553	4.793463	0.902808	5.696271
8.30	7.30	5.80	CASE 1	1.000000	2.500000	4.300000	19.547295	4.793463	0.902808	5.696271
8.31	7.31	5.81	CASE 1	1.000000	2.500000	4.310000	19.570011	4.793463	0.902808	5.696271
8.32	7.32	5.82	CASE 1	1.000000	2.500000	4.320000	19.592701	4.793463	0.902808	5.696271
8.33	7.33	5.83	CASE 1	1.000000	2.500000	4.330000	19.615365	4.793463	0.902808	5.696271
8.34	7.34	5.84	CASE 1	1.000000	2.500000	4.340000	19.638002	4.793463	0.902808	5.696271
8.35	7.35	5.85	CASE 1	1.000000	2.500000	4.350000	19.660614	4.793463	0.902808	5.696271
8.36	7.36	5.86	CASE 1	1.000000	2.500000	4.360000	19.683199	4.793463	0.902808	5.696271
8.37	7.37	5.87	CASE 1	1.000000	2.500000	4.370000	19.705759	4.793463	0.902808	5.696271
8.38	7.38	5.88	CASE 1	1.000000	2.500000	4.380000	19.728293	4.793463	0.902808	5.696271
8.39	7.39	5.89	CASE 1	1.000000	2.500000	4.390000	19.750801	4.793463	0.902808	5.696271
8.40	7.40	5.90	CASE 1	1.000000	2.500000	4.400000	19.773283	4.793463	0.902808	5.696271
8.41	7.41	5.91	CASE 1	1.000000	2.500000	4.410000	19.795740	4.793463	0.902808	5.696271
8.42	7.42	5.92	CASE 1	1.000000	2.500000	4.420000	19.818171	4.793463	0.902808	5.696271
8.43	7.43	5.93	CASE 1	1.000000	2.500000	4.430000	19.840577	4.793463	0.902808	5.696271
8.44	7.44	5.94	CASE 1	1.000000	2.500000	4.440000	19.862958	4.793463	0.902808	5.696271
8.45	7.45	5.95	CASE 1	1.000000	2.500000	4.450000	19.885314	4.793463	0.902808	5.696271
8.46	7.46	5.96	CASE 1	1.000000	2.500000	4.460000	19.907644	4.793463	0.902808	5.696271
8.47	7.47	5.97	CASE 1	1.000000	2.500000	4.470000	19.929950	4.793463	0.902808	5.696271
8.48	7.48	5.98	CASE 1	1.000000	2.500000	4.480000	19.952230	4.793463	0.902808	5.696271
8.49	7.49	5.99	CASE 1	1.000000	2.500000	4.490000	19.974486	4.793463	0.902808	5.696271
8.50	7.50	6.00	CASE 1	1.000000	2.500000	4.500000	19.996717	4.793463	0.902808	5.696271
8.51	7.51	6.01	CASE 1	1.000000	2.500000	4.510000	20.018923	4.793463	0.902808	5.696271
8.52	7.52	6.02	CASE 1	1.000000	2.500000	4.520000	20.041105	4.793463	0.902808	5.696271
8.53	7.53	6.03	CASE 1	1.000000	2.500000	4.530000	20.063262	4.793463	0.902808	5.696271
8.54	7.54	6.04	CASE 1	1.000000	2.500000	4.540000	20.085395	4.793463	0.902808	5.696271
8.55	7.55	6.05	CASE 1	1.000000	2.500000	4.550000	20.107503	4.793463	0.902808	5.696271
8.56	7.56	6.06	CASE 1	1.000000	2.500000	4.560000	20.129587	4.793463	0.902808	5.696271
8.57	7.57	6.07	CASE 1	1.000000	2.500000	4.570000	20.151647	4.793463	0.902808	5.696271
8.58	7.58	6.08	CASE 1	1.000000	2.500000	4.580000	20.173683	4.793463	0.902808	5.696271
8.59	7.59	6.09	CASE 1	1.000000	2.500000	4.590000	20.195694	4.793463	0.902808	5.696271
8.60	7.60	6.10	CASE 1	1.000000	2.500000	4.600000	20.217682	4.793463	0.902808	5.696271
8.61	7.61	6.11	CASE 1	1.000000	2.500000	4.610000	20.239646	4.793463	0.902808	5.696271
8.62	7.62	6.12	CASE 1	1.000000	2.500000	4.620000	20.261586	4.793463	0.902808	5.696271
8.63	7.63	6.13	CASE 1	1.000000	2.500000	4.630000	20.283502	4.793463	0.902808	5.696271
8.64	7.64	6.14	CASE 1	1.000000	2.500000	4.640000	20.305395	4.793463	0.902808	5.696271
8.65	7.65	6.15	CASE 1	1.000000	2.500000	4.650000	20.327264	4.793463	0.902808	5.696271
8.66	7.66	6.16	CASE 1	1.000000	2.500000	4.660000	20.349109	4.793463	0.902808	5.696271
8.67	7.67	6.17	CASE 1	1.000000	2.500000	4.670000	20.370931	4.793463	0.902808	5.696271
8.68	7.68	6.18	CASE 1	1.000000	2.500000	4.680000	20.392730	4.793463	0.902808	5.696271
8.69	7.69	6.19	CASE 1	1.000000	2.500000	4.690000	20.414506	4.793463	0.902808	5.696271
8.70	7.70	6.20	CASE 1	1.000000	2.500000	4.700000	20.436258	4.793463	0.902808	5.696271
8.71	7.71	6.21	CASE 1	1.000000	2.500000	4.710000	20.457987	4.793463	0.902808	5.696271
8.72	7.72	6.22	CASE 1	1.000000	2.500000	4.720000	20.479693	4.793463	0.902808	5.696271
8.73	7.73	6.23	CASE 1	1.000000	2.500000	4.730000	20.501376	4.793463	0.902808	5.696271
8.74	7.74	6.24	CASE 1	1.000000	2.500000	4.740000	20.523036	4.793463	0.902808	5.696271
8.75	7.75	6.25	CASE 1	1.000000	2.500000	4.750000	20.544674	4.793463	0.902808	5.696271
8.76	7.76	6.26	CASE 1	1.000000	2.500000	4.760000	20.566288	4.793463	0.902808	5.696271
8.77	7.77	6.27	CASE 1	1.000000	2.500000	4.770000	20.587880	4.793463	0.902808	5.696271
8.78	7.78	6.28	CASE 1	1.000000	2.500000	4.780000	20.609450	4.793463	0.902808	5.696271
8.79	7.79	6.29	CASE 1	1.000000	2.500000	4.790000	20.630996	4.793463	0.902808	5.696271
8.80	7.80	6.30	CASE 1	1.000000	2.500000	4.800000	20.652521	4.793463	0.902808	5.696271
8.81	7.81	6.31	CASE 1	1.000000	2.500000	4.810000	20.674022	4.793463	0.902808	5.696271
8.82	7.82	6.32	CASE 1	1.000000	2.500000	4.820000	20.695502	4.793463	0.902808	5.696271
8.83	7.83	6.33	CASE 1	1.000000	2.500000	4.830000	20.716959	4.793463	0.902808	5.696271
8.84	7.84	6.34	CASE 1	1.000000	2.500000	4.840000	20.738394	4.793463	0.902808	5.696271
8.85	7.85	6.35	CASE 1	1.000000	2.500000	4.850000	20.759807	4.793463	0.902808	5.696271
8.86	7.86	6.36	CASE 1	1.000000	2.500000	4.860000	20.781198	4.793463	0.902808	5.696271
8.87	7.87	6.37	CASE 1	1.000000	2.500000	4.870000	20.802567	4.793463	0.902808	5.696271
8.88	7.88	6.38	CASE 1	1.000000	2.500000	4.880000	20.823914	4.793463	0.902808	5.696271
8.89	7.89	6.39	CASE 1	1.000000	2.500000	4.890000	20.845239	4.793463	0.902808	5.696271
8.90	7.90	6.40	CASE 1	1.000000	2.500000	4.900000	20.866542	4.793463	0.902808	5.696271
8.91	7.91	6.41	CASE 1	1.000000	2.500000	4.910000	20.887824	4.793463	0.902808	5.696271
8.92	7.92	6.42	CASE 1	1.000000	2.500000	4.920000	20.909083	4.793463	0.902808	5.696271
8.93	7.93	6.43	CASE 1	1.000000	2.500000	4.930000	20.930322	4.793463	0.902808	5.696271
8.94	7.94	6.44	CASE 1	1.000000	2.500000	4.940000	20.951538	4.793463	0.902808	5.696271
8.95	7.95	6.45	CASE 1	1.000000	2.500000	4.950000	20.972734	4.793463	0.902808	5.696271
8.96	7.96	6.46	CASE 1	1.000000	2.500000	4.960000	20.993908	4.793463	0.902808	5.696271
8.97	7.97	6.47	CASE 1	1.000000	2.500000	4.970000	21.015060	4.793463	0.902808	5.696271

St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
STAGE VS. DISCHARGE
TAILWATER ELEVATION -5 ft ASSUMED



St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
STAGE VS. DISCHARGE
TAILWATER ELEVATION -5 ft ASSUMED

TAILWATER (ft ASSUMED)	STAGE (ft ASSUMED)	FLOW (cfs)
-5.00	4.00	0.000000
-5.00	4.01	0.018133
-5.00	4.02	0.051289
-5.00	4.03	0.094224
-5.00	4.04	0.145067
-5.00	4.05	0.202737
-5.00	4.06	0.266504
-5.00	4.07	0.335834
-5.00	4.08	0.410310
-5.00	4.09	0.489600
-5.00	4.10	0.573426
-5.00	4.11	0.661556
-5.00	4.12	0.753789
-5.00	4.13	0.849949
-5.00	4.14	0.949882
-5.00	4.15	1.053451
-5.00	4.16	1.160533
-5.00	4.17	1.271016
-5.00	4.18	1.384798
-5.00	4.19	1.501786
-5.00	4.20	1.621895
-5.00	4.21	1.745045
-5.00	4.22	1.871163
-5.00	4.23	2.000181
-5.00	4.24	2.132036
-5.00	4.25	2.266667
-5.00	4.26	2.404018
-5.00	4.27	2.544036
-5.00	4.28	2.686672
-5.00	4.29	2.831879
-5.00	4.30	2.979611
-5.00	4.31	3.129826
-5.00	4.32	3.282484
-5.00	4.33	3.437546
-5.00	4.34	3.594976
-5.00	4.35	3.754739
-5.00	4.36	3.916800
-5.00	4.37	4.081128
-5.00	4.38	4.247692
-5.00	4.39	4.416463
-5.00	4.40	4.587411
-5.00	4.41	4.760509
-5.00	4.42	4.935732
-5.00	4.43	5.113053
-5.00	4.44	5.292449
-5.00	4.45	5.473894
-5.00	4.46	5.657368
-5.00	4.47	5.696271
-5.00	4.48	5.696271
-5.00	4.49	5.696271
-5.00	4.50	5.696271
-5.00	4.51	5.696271
-5.00	4.52	5.696271
-5.00	4.53	5.696271
-5.00	4.54	5.696271
-5.00	4.55	5.696271
-5.00	4.56	5.696271
-5.00	4.57	5.696271
-5.00	4.58	5.696271
-5.00	4.59	5.696271
-5.00	4.60	5.696271
-5.00	4.61	5.696271
-5.00	4.62	5.696271
-5.00	4.63	5.696271
-5.00	4.64	5.696271
-5.00	4.65	5.696271
-5.00	4.66	5.696271
-5.00	4.67	5.696271
-5.00	4.68	5.696271
-5.00	4.69	5.696271
-5.00	4.70	5.696271
-5.00	4.71	5.696271

St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
STAGE VS. DISCHARGE
TAILWATER ELEVATION -5 ft ASSUMED

TAILWATER (ft ASSUMED)	STAGE (ft ASSUMED)	FLOW (cfs)
-5.00	4.72	5.696271
-5.00	4.73	5.696271
-5.00	4.74	5.696271
-5.00	4.75	5.696271
-5.00	4.76	5.696271
-5.00	4.77	5.696271
-5.00	4.78	5.696271
-5.00	4.79	5.696271
-5.00	4.80	5.696271
-5.00	4.81	5.696271
-5.00	4.82	5.696271
-5.00	4.83	5.696271
-5.00	4.84	5.696271
-5.00	4.85	5.696271
-5.00	4.86	5.696271
-5.00	4.87	5.696271
-5.00	4.88	5.696271
-5.00	4.89	5.696271
-5.00	4.90	5.696271
-5.00	4.91	5.696271
-5.00	4.92	5.696271
-5.00	4.93	5.696271
-5.00	4.94	5.696271
-5.00	4.95	5.696271
-5.00	4.96	5.696271
-5.00	4.97	5.696271
-5.00	4.98	5.696271
-5.00	4.99	5.696271
-5.00	5.00	5.696271
-5.00	5.01	5.696271
-5.00	5.02	5.696271
-5.00	5.03	5.696271
-5.00	5.04	5.696271
-5.00	5.05	5.696271
-5.00	5.06	5.696271
-5.00	5.07	5.696271
-5.00	5.08	5.696271
-5.00	5.09	5.696271
-5.00	5.10	5.696271
-5.00	5.11	5.696271
-5.00	5.12	5.696271
-5.00	5.13	5.696271
-5.00	5.14	5.696271
-5.00	5.15	5.696271
-5.00	5.16	5.696271
-5.00	5.17	5.696271
-5.00	5.18	5.696271
-5.00	5.19	5.696271
-5.00	5.20	5.696271
-5.00	5.21	5.696271
-5.00	5.22	5.696271
-5.00	5.23	5.696271
-5.00	5.24	5.696271
-5.00	5.25	5.696271
-5.00	5.26	5.696271
-5.00	5.27	5.696271
-5.00	5.28	5.696271
-5.00	5.29	5.696271
-5.00	5.30	5.696271
-5.00	5.31	5.696271
-5.00	5.32	5.696271
-5.00	5.33	5.696271
-5.00	5.34	5.696271
-5.00	5.35	5.696271
-5.00	5.36	5.696271
-5.00	5.37	5.696271
-5.00	5.38	5.696271
-5.00	5.39	5.696271
-5.00	5.40	5.696271
-5.00	5.41	5.696271
-5.00	5.42	5.696271
-5.00	5.43	5.696271

St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
STAGE VS. DISCHARGE
TAILWATER ELEVATION -5 ft ASSUMED

TAILWATER (ft ASSUMED)	STAGE (ft ASSUMED)	FLOW (cfs)
-5.00	5.44	5.696271
-5.00	5.45	5.696271
-5.00	5.46	5.696271
-5.00	5.47	5.696271
-5.00	5.48	5.696271
-5.00	5.49	5.696271
-5.00	5.50	5.696271
-5.00	5.51	5.696271
-5.00	5.52	5.696271
-5.00	5.53	5.696271
-5.00	5.54	5.696271
-5.00	5.55	5.696271
-5.00	5.56	5.696271
-5.00	5.57	5.696271
-5.00	5.58	5.696271
-5.00	5.59	5.696271
-5.00	5.60	5.696271
-5.00	5.61	5.696271
-5.00	5.62	5.696271
-5.00	5.63	5.696271
-5.00	5.64	5.696271
-5.00	5.65	5.696271
-5.00	5.66	5.696271
-5.00	5.67	5.696271
-5.00	5.68	5.696271
-5.00	5.69	5.696271
-5.00	5.70	5.696271
-5.00	5.71	5.696271
-5.00	5.72	5.696271
-5.00	5.73	5.696271
-5.00	5.74	5.696271
-5.00	5.75	5.696271
-5.00	5.76	5.696271
-5.00	5.77	5.696271
-5.00	5.78	5.696271
-5.00	5.79	5.696271
-5.00	5.80	5.696271
-5.00	5.81	5.696271
-5.00	5.82	5.696271
-5.00	5.83	5.696271
-5.00	5.84	5.696271
-5.00	5.85	5.696271
-5.00	5.86	5.696271
-5.00	5.87	5.696271
-5.00	5.88	5.696271
-5.00	5.89	5.696271
-5.00	5.90	5.696271
-5.00	5.91	5.696271
-5.00	5.92	5.696271
-5.00	5.93	5.696271
-5.00	5.94	5.696271
-5.00	5.95	5.696271
-5.00	5.96	5.696271
-5.00	5.97	5.696271
-5.00	5.98	5.696271
-5.00	5.99	5.696271
-5.00	6.00	5.696271
-5.00	6.01	5.696271
-5.00	6.02	5.696271
-5.00	6.03	5.696271
-5.00	6.04	5.696271
-5.00	6.05	5.696271
-5.00	6.06	5.696271
-5.00	6.07	5.696271
-5.00	6.08	5.696271
-5.00	6.09	5.696271
-5.00	6.10	5.696271
-5.00	6.11	5.696271
-5.00	6.12	5.696271
-5.00	6.13	5.696271
-5.00	6.14	5.696271
-5.00	6.15	5.696271

St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
STAGE VS. DISCHARGE
TAILWATER ELEVATION -5 ft ASSUMED

TAILWATER (ft ASSUMED)	STAGE (ft ASSUMED)	FLOW (cfs)
-5.00	6.16	5.696271
-5.00	6.17	5.696271
-5.00	6.18	5.696271
-5.00	6.19	5.696271
-5.00	6.20	5.696271
-5.00	6.21	5.696271
-5.00	6.22	5.696271
-5.00	6.23	5.696271
-5.00	6.24	5.696271
-5.00	6.25	5.696271
-5.00	6.26	5.696271
-5.00	6.27	5.696271
-5.00	6.28	5.696271
-5.00	6.29	5.696271
-5.00	6.30	5.696271
-5.00	6.31	5.696271
-5.00	6.32	5.696271
-5.00	6.33	5.696271
-5.00	6.34	5.696271
-5.00	6.35	5.696271
-5.00	6.36	5.696271
-5.00	6.37	5.696271
-5.00	6.38	5.696271
-5.00	6.39	5.696271
-5.00	6.40	5.696271
-5.00	6.41	5.696271
-5.00	6.42	5.696271
-5.00	6.43	5.696271
-5.00	6.44	5.696271
-5.00	6.45	5.696271
-5.00	6.46	5.696271
-5.00	6.47	5.696271
-5.00	6.48	5.696271
-5.00	6.49	5.696271
-5.00	6.50	5.696271
-5.00	6.51	5.696271
-5.00	6.52	5.696271
-5.00	6.53	5.696271
-5.00	6.54	5.696271
-5.00	6.55	5.696271
-5.00	6.56	5.696271
-5.00	6.57	5.696271
-5.00	6.58	5.696271
-5.00	6.59	5.696271
-5.00	6.60	5.696271
-5.00	6.61	5.696271
-5.00	6.62	5.696271
-5.00	6.63	5.696271
-5.00	6.64	5.696271
-5.00	6.65	5.696271
-5.00	6.66	5.696271
-5.00	6.67	5.696271
-5.00	6.68	5.696271
-5.00	6.69	5.696271
-5.00	6.70	5.696271
-5.00	6.71	5.696271
-5.00	6.72	5.696271
-5.00	6.73	5.696271
-5.00	6.74	5.696271
-5.00	6.75	5.696271
-5.00	6.76	5.696271
-5.00	6.77	5.696271
-5.00	6.78	5.696271
-5.00	6.79	5.696271
-5.00	6.80	5.696271
-5.00	6.81	5.696271
-5.00	6.82	5.696271
-5.00	6.83	5.696271
-5.00	6.84	5.696271
-5.00	6.85	5.696271
-5.00	6.86	5.696271
-5.00	6.87	5.696271

St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
STAGE VS. DISCHARGE
TAILWATER ELEVATION -5 ft ASSUMED

TAILWATER (ft ASSUMED)	STAGE (ft ASSUMED)	FLOW (cfs)
-5.00	6.88	5.696271
-5.00	6.89	5.696271
-5.00	6.90	5.696271
-5.00	6.91	5.696271
-5.00	6.92	5.696271
-5.00	6.93	5.696271
-5.00	6.94	5.696271
-5.00	6.95	5.696271
-5.00	6.96	5.696271
-5.00	6.97	5.696271
-5.00	6.98	5.696271
-5.00	6.99	5.696271
-5.00	7.00	5.696271
-5.00	7.01	5.696271
-5.00	7.02	5.696271
-5.00	7.03	5.696271
-5.00	7.04	5.696271
-5.00	7.05	5.696271
-5.00	7.06	5.696271
-5.00	7.07	5.696271
-5.00	7.08	5.696271
-5.00	7.09	5.696271
-5.00	7.10	5.696271
-5.00	7.11	5.696271
-5.00	7.12	5.696271
-5.00	7.13	5.696271
-5.00	7.14	5.696271
-5.00	7.15	5.696271
-5.00	7.16	5.696271
-5.00	7.17	5.696271
-5.00	7.18	5.696271
-5.00	7.19	5.696271
-5.00	7.20	5.696271
-5.00	7.21	5.696271
-5.00	7.22	5.696271
-5.00	7.23	5.696271
-5.00	7.24	5.696271
-5.00	7.25	5.696271
-5.00	7.26	5.696271
-5.00	7.27	5.696271
-5.00	7.28	5.696271
-5.00	7.29	5.696271
-5.00	7.30	5.696271
-5.00	7.31	5.696271
-5.00	7.32	5.696271
-5.00	7.33	5.696271
-5.00	7.34	5.696271
-5.00	7.35	5.696271
-5.00	7.36	5.696271
-5.00	7.37	5.696271
-5.00	7.38	5.696271
-5.00	7.39	5.696271
-5.00	7.40	5.696271
-5.00	7.41	5.696271
-5.00	7.42	5.696271
-5.00	7.43	5.696271
-5.00	7.44	5.696271
-5.00	7.45	5.696271
-5.00	7.46	5.696271
-5.00	7.47	5.696271
-5.00	7.48	5.696271
-5.00	7.49	5.696271
-5.00	7.50	5.696271
-5.00	7.51	5.696271
-5.00	7.52	5.696271
-5.00	7.53	5.696271
-5.00	7.54	5.696271
-5.00	7.55	5.696271
-5.00	7.56	5.696271
-5.00	7.57	5.696271
-5.00	7.58	5.696271
-5.00	7.59	5.696271

St Anthony Falls Research Laboratory
THIRSTY DUCK ER-202C SERIES
STAGE VS. DISCHARGE
TAILWATER ELEVATION -5 ft ASSUMED

TAILWATER (ft ASSUMED)	STAGE (ft ASSUMED)	FLOW (cfs)
-5.00	7.60	5.696271
-5.00	7.61	5.696271
-5.00	7.62	5.696271
-5.00	7.63	5.696271
-5.00	7.64	5.696271
-5.00	7.65	5.696271
-5.00	7.66	5.696271
-5.00	7.67	5.696271
-5.00	7.68	5.696271
-5.00	7.69	5.696271
-5.00	7.70	5.696271
-5.00	7.71	5.696271
-5.00	7.72	5.696271
-5.00	7.73	5.696271
-5.00	7.74	5.696271
-5.00	7.75	5.696271
-5.00	7.76	5.696271
-5.00	7.77	5.696271
-5.00	7.78	5.696271
-5.00	7.79	5.696271
-5.00	7.80	5.696271
-5.00	7.81	5.696271
-5.00	7.82	5.696271
-5.00	7.83	5.696271
-5.00	7.84	5.696271
-5.00	7.85	5.696271
-5.00	7.86	5.696271
-5.00	7.87	5.696271
-5.00	7.88	5.696271
-5.00	7.89	5.696271
-5.00	7.90	5.696271
-5.00	7.91	5.696271
-5.00	7.92	5.696271
-5.00	7.93	5.696271
-5.00	7.94	5.696271
-5.00	7.95	5.696271
-5.00	7.96	5.696271
-5.00	7.97	5.696271
-5.00	7.98	5.696271
-5.00	7.99	5.696271
-5.00	8.00	5.696271
-5.00	8.01	5.696271
-5.00	8.02	5.696271
-5.00	8.03	5.696271
-5.00	8.04	5.696271
-5.00	8.05	5.696271
-5.00	8.06	5.696271
-5.00	8.07	5.696271
-5.00	8.08	5.696271
-5.00	8.09	5.696271
-5.00	8.10	5.696271
-5.00	8.11	5.696271
-5.00	8.12	5.696271
-5.00	8.13	5.696271
-5.00	8.14	5.696271
-5.00	8.15	5.696271
-5.00	8.16	5.696271
-5.00	8.17	5.696271
-5.00	8.18	5.696271
-5.00	8.19	5.696271
-5.00	8.20	5.696271
-5.00	8.21	5.696271
-5.00	8.22	5.696271
-5.00	8.23	5.696271
-5.00	8.24	5.696271
-5.00	8.25	5.696271
-5.00	8.26	5.696271

Appendix C – Debris Test Video